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Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Sound Waves, Telephone Magazine, and The Telephone

PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY, MONADNOCK BLOCK, CHICAGO

VOL. XVI. No. 18 | CHICAGO, DECEMBER 12, 1908 | 10 CENTS PER COPY · $2 PER YEAR TO U. S. AND MEXICO · $3 PER YEAR TO OTHER COUNTRIES

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OKONITE TRADE MARK REG. U.S. PAT. OFFICE

1889 Paris Exposition Medal for Rubber Insulation · 1893 World's Fair Medal for Rubber Insulation

The Standard for Rubber Insulation

OKONITE WIRES, OKONITE TAPE, MANSON TAPE, CANDEE PAT'D POTHEADS

THE OKONITE CO., Ltd. Sole Manufacturers 253 Broadway, New York

WILLARD L. CANDEE, H. DURANT CHEEVER, MANAGERS · W. H. HODGINS, SECRETARY · GEO. S. MANSON, SUPERINTENDENT · W. C. CANDEE, ASS'T SECRETARY

OKONITE TRADE MARK REG. U.S. PAT. OFFICE

CONDUIT

P C C

CLAY PRODUCT COMPANY

Stock Exchange Bldg. CHICAGO

Telephone Wires, Cables AND Cable Accessories

EVERYTHING IN ELECTRICAL CONDUCTORS

Standard Underground Cable Co.

PITTSBURGH, PA.

Boston, New York · Philadelphia, Chicago · St. Louis, San Francisco

McROY CONDUITS

CHICAGO ROOKERY BUILDING

KERITE

Insulated Wires and Cables

DAYS KERITE 1850 1908

The Insulation which has withstood successfully the test of half a century

W. R. BRIXEY, Sole Manufacturer

HUDSON TERMINAL

30 Church Street, NEW YORK

CHICAGO TELEPHONES SATISFY

CHICAGO TELEPHONE SUPPLY CO.

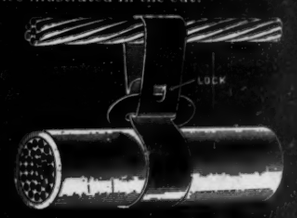
FACTORY AND GENERAL OFFICES

ELKHART, IND. U.S.A.

METROPOLITAN CABLE CLIP

Type "B"

The most efficient cable hanger for cables of moderate size on the market. Easily applied; durable and cheaper in the long run than marline hangers. Note the new locking device illustrated in the cut:



Manufactured in two sizes as follows:
7-in. size fits cable up to 1 in. diameter.
9-in. size fits cable from 1-in. to 1½ in. diameter.
For larger cables, use our well known type "A" Metropolitan Cable Clip.

Manufactured by

YONKERS SPECIALTY COMPANY

YONKERS, N. Y.

"DETROIT" RUBBER COVERED WIRES

Telephone Pair a Specialty

DETROIT INSULATED WIRE CO.

Detroit, Mich.

PLATINUM

Wire, Sheet, Rivets and Contacts

Send for Literature

BAKER & CO., Inc., Newark, N.J.

N. Y. Office: 30 Church Street

TELEPHONE CABLE

WATERBURY CO., 69 SOUTH STREET, NEW YORK CITY

ALPHABETICAL INDEX TO ADVERTISEMENTS ON PAGE 20

1908-Lease Records-1909

Send for our "Newform." The best companies all use it, and reorder year after year.

Our Improved Cash Book is just out and going fast. The most valuable form yet devised for keeping detailed Telephone Accounts simply and accurately. Used and approved by best Telephone Accountants.

Our Books, Blanks and Forms for Telephone and Toll Line Accounting are "Standard" and used more than any other. Write for sample forms and prices.

THE TELEPHONE PRINTING COMPANY
DEFIANCE, OHIO

The Indiana Rubber & Insulated Wire Co.

PARANITE TRADE MARK

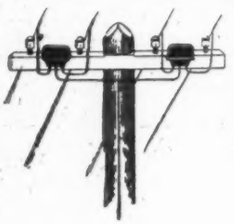
MANUFACTURERS OF

Insulated Wires and Cables

JONESBORO, IND.

There is some class to

Chapman Lightning Arresters



Modern construction demands them and the most discriminating buyers insist on having them.

There is no other "Just as Good"

MINNESOTA ELECTRIC CO.
MINNEAPOLIS, MINN.

SKY ROCKET LIGHTNING ARRESTERS

The BEST Non-Attention Type ARRESTER on the Market.

MOORER RE-ACTANCE ARRESTER
has a Flat Re-Actance Coil made Fuse Shaped.

This ARRESTER ARRESTS. Extra coils, should coils burn out, furnished at 2½ cents each.

THE "400 COMPANION"
converts your old 400 into an up-to-date Choke Coil Arrester at a cost of **only 25 cents.**

Test Racks, Test Panels, Tie Wire Formers, and many other Good Things.

Write the **Chance Manufacturing Company**
Centralia, Mo.

COPE'S PATENT CABLE RACK
and Conduit Rods

FOR MANHOLES, VAULTS AND DUCTS

Cheapest, strongest and most convenient CABLE RACK made. Costs but little more than wood and is indestructible, more durable and convenient. Made in all sizes.

CONDUIT RODS are made in 3 and 4 foot lengths. Quickly coupled and uncoupled, they are the best rod on the market

T. J. COPE *ENGINEER AND CONTRACTOR*
3244 North 15th St., PHILADELPHIA, PA.

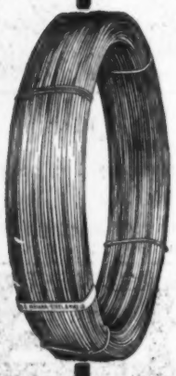
Manufacturer of all tools appertaining to Underground Construction. Write for catalogue describing Cope specialties.

Inland Telephones and Switchboards
ARE PERFECT

Get our prices on
Bridging Telephones, Series Telephones' Desk Telephones, Magneto Bells, Extension Bells, Transmitters, Receivers, Induction Coils, Dry Batteries, Switchboards, Operators' Receivers, Operators Transmitters, Construction Material and all other Exchange Equipment.

All orders shipped same day on which they are received

INLAND ELECTRIC COMPANY
211-213 CHESTNUT STREET :: :: ST. LOUIS



The Wire of Quality

TELEPHONE WIRE

Best by Every Test

A Difference in Wire makes a Difference in Service.

LONGEST LIFE—HIGHEST EFFICIENCY

Universities have tested our wire and found it of the highest quality. Leading Telephone Companies use it, with perfect satisfaction in most exacting service.

Write for Samples and Prices Today

Handled by Representative Jobbers and Supply Houses

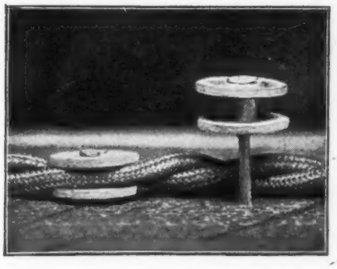
INDIANA STEEL & WIRE COMPANY
MUNCIE, INDIANA

Eureka Fibre Insulators

A NEW STYLE

"PRICES TO POINT, WHERE IT IS ECONOMY TO USE THEM"

The value is in the method that they are attached without injury to the wire.

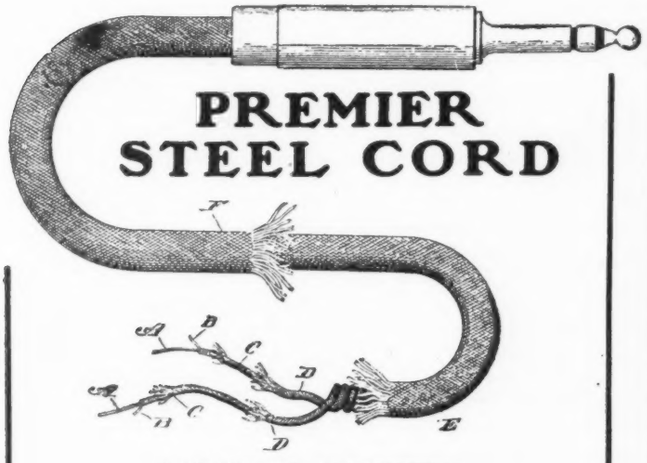


Made in Three Types
50, 60, 70
¾", ⅞", and 1" long respectively.

PRICES AND SAMPLES ON APPLICATION

COMMERCIAL ELECTRICAL SUPPLY CO.

Fifteenth and Pine Streets ST. LOUIS, MO.



PREMIER STEEL CORD

ALWAYS IN ALIGNMENT

In the hollow of the cord at the plug end, there's a reinforcing spring made of the highest grade spring steel. Not only does this prevent the conductors from being thrown out of alignment, but it also makes it practically impossible to break the cord at the plug end, and that's where the strain is greatest. Operators don't have to be careful when you use Premier Steel Cord—it'll last in spite of shamefully careless usage. Better get details.

Runzel-Lenz Electric Mfg. Co.
97-101 South Clinton Street, Chicago

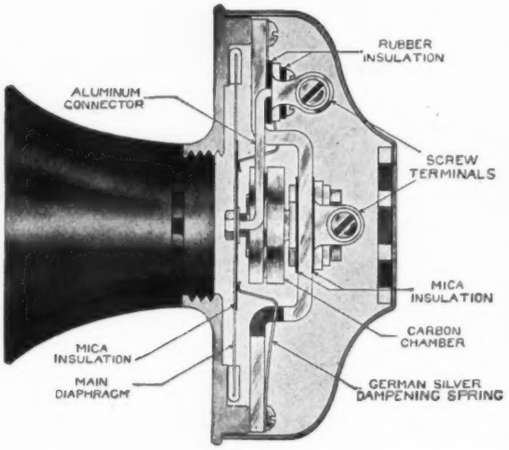
Five Men on a 95 cent PEIRCE SEAT

We make six designs of seats, three all steel and three with wood seats.

Get circulars.

Peirce Specialty Co.
ELKHART, IND.

Cracraft, Leich Transmitters



not only show an initially high factory test, but this excellence is uniformly maintained.

In Cracraft, Leich transmitters the carbon chamber is allowed to take its own natural set before it is permanently clamped into the solid back, all this being done before it reaches the testing department. If the transmitter then does not come up to the highest test, there is a mechanical defect. If defective they are taken apart and the defective part is located and replaced. They are not doctored by imparting a different tension on the auxiliary diaphragm, nor are other irregular means resorted to, in order to make the talking qualities efficient.

This is one of the reasons of the staying qualities of Cracraft, Leich Transmitters.

Cracraft, Leich Electric Co. Genoa, Ill.

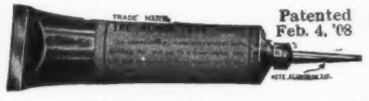
Insulated Staples

5 Sizes

Pat. Nov. 1900

BLAKE
TUBE FLUX for SOLDERING

Full Size of Tube, 1" x 5"

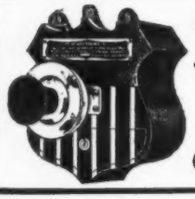


Patented Feb. 4, '08

COMPRESSED CLEATS FOR USE ON PLASTERING

EXACT SIZE PAT. JULY 1906

BLAKE SIGNAL & MFG. CO. WRITE FOR SAMPLES 246 SUMMER ST., BOSTON, MASS.

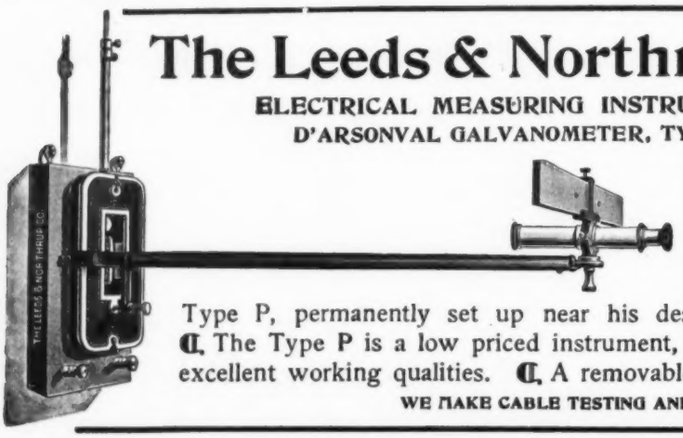


DO YOU WANT WHAT'S DUE YOU?

THEN INSTALL **GRAY PAY STATIONS** AND YOU'LL GET IT

All details are in Catalog No. 50. Write for a copy.

GRAY TELEPHONE PAY STATION CO., Hartford, Conn.



The Leeds & Northrup Co.,

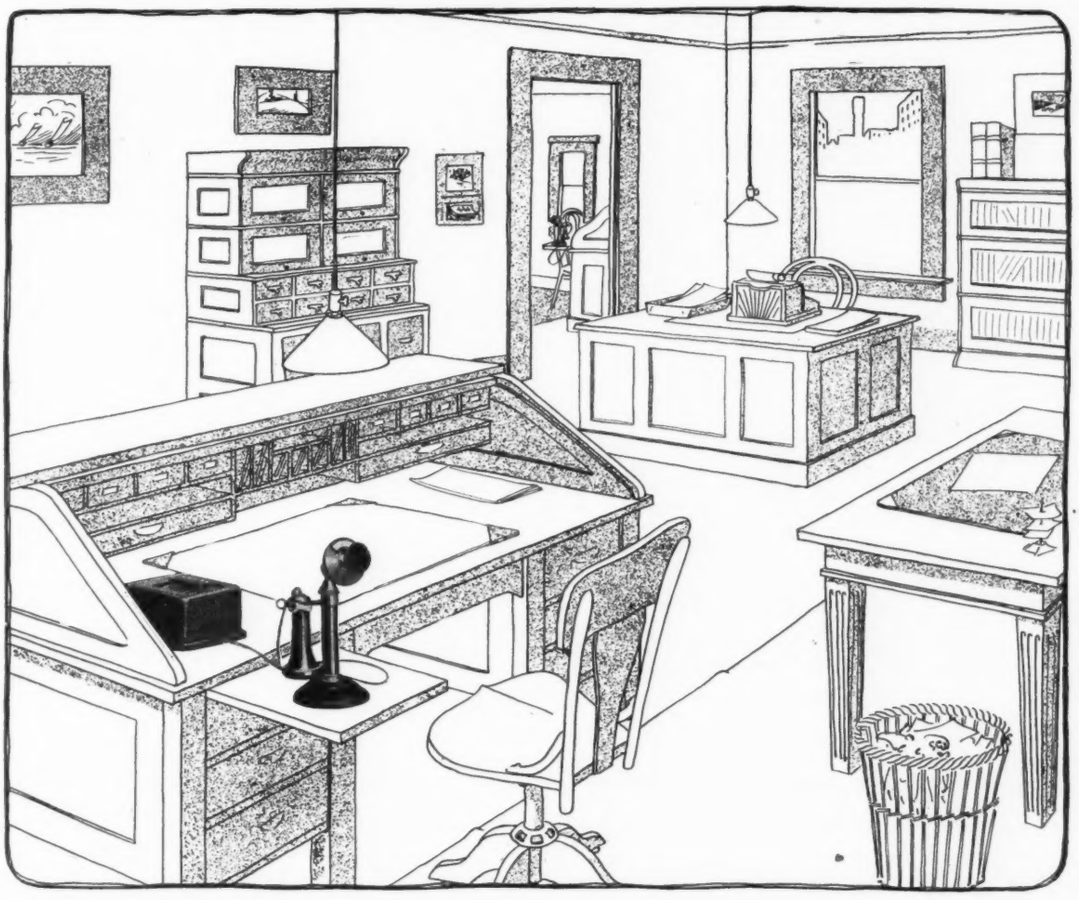
4901 Stenton Avenue
PHILADELPHIA
Monadnock Block
CHICAGO

ELECTRICAL MEASURING INSTRUMENTS
D'ARSONVAL GALVANOMETER, TYPE P

¶ Your wire chief has use for a reflecting type D'Arsonval Galvanometer. His cable testing set will have a greater range if he can make insulation and capacity measurements with a reflecting galvanometer. With our Type P, permanently set up near his desk, he can make routine tests of insulation. ¶ The Type P is a low priced instrument, well made, of pleasing appearance, and has excellent working qualities. ¶ A removable damper converts it for ballistic measurements.

WE MAKE CABLE TESTING AND FAULT LOCATING APPARATUS

Please tell the Advertiser you saw his Announcement in TELEPHONY.



INTERCOMMUNICATING TELEPHONE SYSTEM FOR BUSINESS USE

The aggregate of employees' time, that a telephone system throughout the office, factory or store will save in a single day, is enormous. Consider the money lost in time spent by employees running about the place to enforce orders and obtain information. All these people are making confusion passing up and down aisles – they are wasting time in visiting for a few minutes after business is transacted—they are fatiguing themselves unnecessarily by climbing up and down stairs—are less efficient in their own work—and are interrupting the work of others. A telephone in every department of the office, factory or store means increased business and a better organization.

The initial cost of "STROMBERG-CARLSON" INTERCOMMUNICATING TELEPHONES is small and their cost of maintenance practically nothing. Right quality—greatly improved design—more accessible assembly—less number of parts—simple to install—superior transmitting and receiving qualities—provided in this entirely new developed equipment.

Write for Booklet No. 165 on Intercommunicating Telephone Systems for Business Use

STROMBERG-CARLSON TEL.MFG.CO

ROCHESTER, NEW YORK, U.S.A.

CHICAGO, ILL. KANSAS CITY, MO.

ANNOUNCEMENT

The "K .B." Lockout System

(KNEISLEY-BILLMAN)

We are pleased to announce that we are now placing on the market the most successful lockout device for party line service ever offered. Owing to its simplicity in construction and operation, economy in installing, and satisfactory results to the operating company as well as to the subscriber, it is destined, we believe, to revolutionize the party line system of telephoning.

WE WANT TO SHOW YOU

WRITE FOR DESCRIPTIVE CIRCULARS
AND FURTHER INFORMATION TO

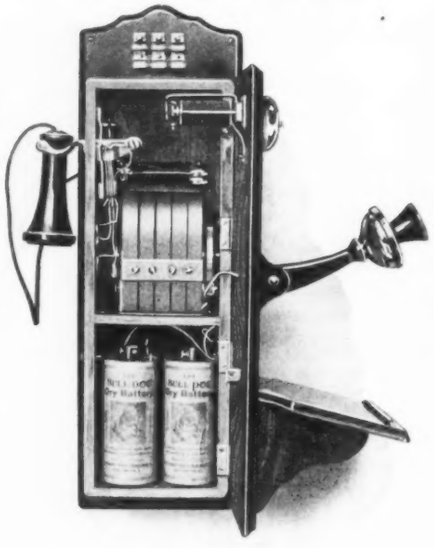
THE DAYTON TELEPHONE LOCKOUT MFG. CO.

DAYTON, OHIO

Our "Jolly Good Fellow"

Continues to be in great demand

MERIT

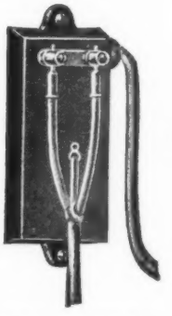


POPULARITY

Open View No. 50

Answer:—STANDARD instruments are made from the best of raw material by the most expert workmen obtainable according to the designs of highly competent engineers. Are you getting satisfaction? The best Magneto telephone is spelled STANDARD.

The Standard Telephone Mfg. Co.
Portsmouth, Ohio
Successors to The Williams Telephone & Supply Co., Cleveland, Ohio.



RELIEF FROM RUBBERNECKS

Andrae "Ring Three" Condensers enable you to ring right by the station that has its receiver off the hook "listening in."

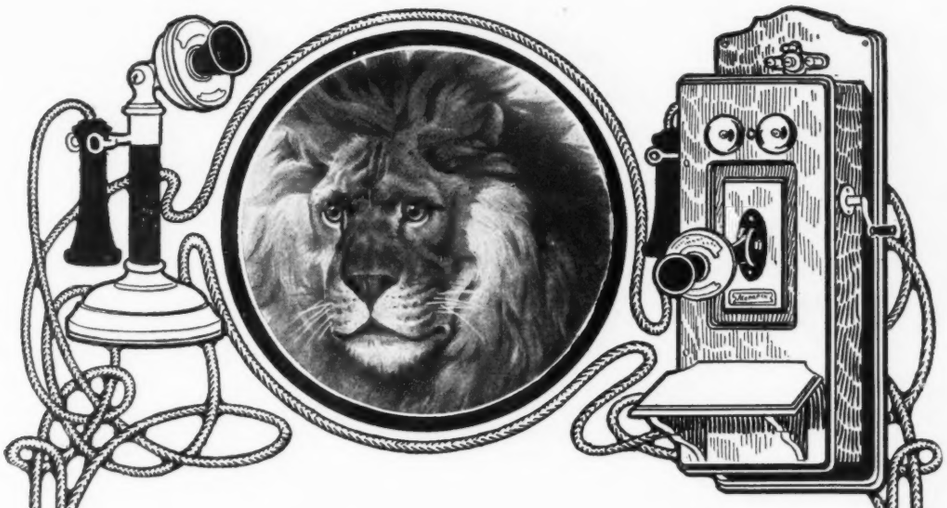
The principal trouble on party lines is the ringing. Sometimes a call goes through, sometimes part of it goes through, and sometimes it does not go through at all.

Many rural subscribers cannot resist the temptation to "listen in." This listening puts a low resistance across the line and picks up the current that should go to the ringer and subscribers and operators wonder why calls are not answered and bells do not ring. Put an Andrae "Ring Three" Condenser on each telephone and bells will ring in spite of the rubbernecks. Ten minutes time and a screwdriver will do the work.

Write for our free trial offer.

Julius Andrae & Sons Co.
217 W. Water Street
MILWAUKEE

Please tell the Advertiser you saw his Announcement in TELEPHONY.



The Most Simple Selective System is the **Direct Current System**

It is reliable where others fail and requires no more attention than a non-selective system.

These Companies are among the ever increasing number that have recognized its unusual merits.

We have been using the Monarch Direct Current Four Party Selective System over two years and have found it a perfect success in every respect.

Plattsmouth Telephone Company
Ashland, Nebraska

We have used this system about a year and feel we are in a position to judge of its merits. The system is entirely satisfactory to ourselves and our subscribers.

Baxter Telephone Company
Baxter Springs, Kansas

We have been able to ring parties selectively without the other parties being bothered with false rings of any kind. We undoubtedly will equip all our four party lines with these instruments.

La Porte (Ind.) Telephone Company

Write for our Bulletin No. 6 which explains its features thoroughly.

MONARCH TELEPHONE MANUFACTURING CO.

FACTORY AND GENERAL OFFICES
CHICAGO
BRANCH HOUSE
DALLAS, TEXAS

7

¶ THE ROBERTS SYSTEM today is the culmination of seven years of constantly sustained effort expended in the production of an ideal party-line system, which would fulfill the demands of all classes of party-line service, and at the same time meet the most onerous and exacting conditions imposed upon it in actual exchange operation.

¶ Of this period, four years was devoted to the trial and test of the System in the operating field.

¶ To accomplish this result, the expenditure of $95,000 in actual cash was required.

¶ Is it not conceivable that a system which is the result of such an outlay of time and money, is worth investigating?

HOMER ROBERTS TELEPHONE CO.

1703 MELROSE STREET, CHICAGO

NEW—AND—GOOD

Crown Metal Telephone

Guaranteed Perfect Mechanically and Electrically

Attractive in Design and Finish

Made of Pressed Steel (or Brass) and Finished in Nickel, Copper Oxidize or Japan.

Useful for Connection Between

Your office and wareroom.
Your neighbor's house and your own.
Your house and your stable.
Your kitchen and servant's room—
or any other two points.

SPECIAL CLAIMS

1st—Being of metal, these telephones will not shrink in dry places or swell in damp places.
2nd—They are as near perfection as human ingenuity can make things.
3rd—They are the cheapest high grade telephones ever offered on the market.

If interested in any other Interior Telephone Apparatus, write us for information. We believe that our facilities, workmanship, materials, prices and products can not be duplicated.

DEALERS WRITE FOR DISCOUNTS

The Standard Mfg. Co.

BRIDGEPORT, CONN.

If You Consider

THE POOLE

Lock-Out System

as an addition to party-line service, you are wrong. It is not something added—it is a feature which has always belonged to good service. It unfailingly gives absolute

SECRECY

to any of the parties on the line. It gives the subscriber all the advantages of a private line at the cost of a party line. It enables you to put more parties on a line, and get higher rates.
Now, do you want details?

Mountain State Electrical Co.,

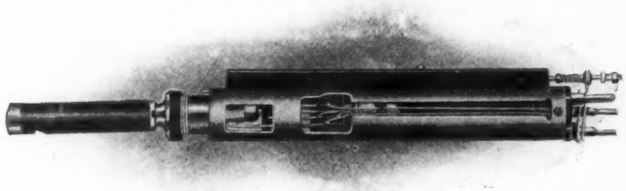
Wheeling, W. Va.

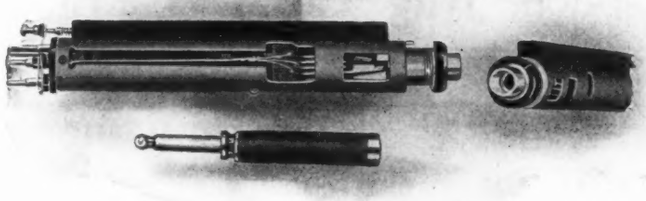
Please tell the Advertiser you saw his Announcement in TELEPHONY.

"THE MARK OF SUPERIORITY"

TRADE MARK

The INDICATOR JACK





is

rapidly gaining the popularity it deserves.

12,300

already in operation in United States.

It is the smallest, most compact, and easiest handled combination drop and jack manufactured.

YOUR INQUIRY WILL BE GIVEN ATTENTION

L.M.ERICSSON TEL.MFG.CO.

BUFFALO, N.Y.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

The New DeVeau All Metal Telephones

Equipped with Exchange Button
This Quartet has No Equal

BALL BEARING

Cat. No. 157

All metal. Ball bearing mechanism. Common return or metallic circuits. All inside terminals. Black rubber finish mounted with nickle trimmings.

Patented March 21, 1899
Patented July 18, 1905
Other patents pending

Cat. No. 1173

Cat. No. 1172

All metal. Black rubber finish mounted with nickle trimmings. Removable switch hook. Clip cover easily removed. Knockout holes on each end for cable.

Send for our descriptive pamphlets

ELIMINATES AUTOMATIC SWITCHBOARDS TELEPHONE
DE VEAU

Cat. No. 126

DeVeau Telephone Mfg. Co. 471 18th Street Brooklyn, N. Y.

TELEPHONE CABLES

TELEPHONE WIRE

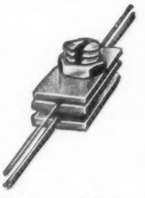
WIRE ROPE
WIRE STRAND

JOHN A. ROEBLING'S SONS CO.

TRENTON, N. J.

BELDEN WIRE TEST CLAMPS

These Wire Test Clamps or Wire and Test Connectors, as they are sometimes called, are used to connect wires temporarily or permanently for testing and various other purposes. The wires are held so firmly with contact surfaces of such large size that Belden Wire Test Clamps can be used in place of soldered joints. This makes them particularly desirable for connecting drops to main lines, for transportation work and for connecting any branch wire to a main wire.



The wires are placed in the slot in the brass screw and are held in place by the copper plates or leaves, one wire being placed between each pair of leaves and secured by the nuts as shown in the illustrations. This makes it possible to connect two wires of different sizes as easily as two wires of the same size. The slot in the brass screw is large enough to receive any ordinary telephone or telegraph wire.

The superiority of this clamp over the old style clamp with shallow grooves, into which it is difficult to force the wires, and the liability of one wire slipping out while the other is being inserted, will be readily appreciated.

NET QUANTITY PRICES

Code Word	Length of Screw	No. of Leaves	Style of Nut	Less than 100	100 to 500	500 or over
Chrism	½ in.	2	Plain	.07	.065	.06
Chrome	1 in.	3	Plain	.09	.085	.08
Chuff	½ in.	2	Winged Thumb	.075	.07	.065
Chute	1 in.	3	Winged Thumb	.095	.09	.085

BELDEN MANUFACTURING COMPANY

194 Michigan Street, Chicago

A Card of Thanks

A Prospective Purchaser carefully inspected the convention exhibits of every telephone manufacturer.

Each Competitor of ours took particular pains to show why his equipment was better than Dean.

The Customer became curious and examined our goods with especial care.

He Bought a Dean board because he found that every criticism was based on some exclusive Dean feature.

Which Reminds Us of what the Manager at Deshler, Ohio, told our respresentative:

¶ "The tree with the most clubs around it, bears the best fruit."

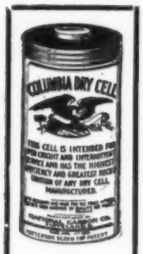
The Dean Electric Company
Elyria, Ohio, U. S. A.
San Francisco Kansas City

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Patterson Wireless Dry Battery Holder

and "SCREW TOP" CELLS are Invaluable in The Telephone Field!

NO BINDING POSTS! NO CONNECTING WIRES!



Patterson Screw Top Cell

For as long as you can remember, you have thought of Battery Cells being connected up with **wires to Binding Posts!**

Perhaps it's occurred to you that the method was a **crude** one, but, perhaps, more than likely on the other hand, you've never given the subject much attention—certainly never appreciated how **really crude the Binding Post method was!**

The Patterson Screw Top Type Battery Cell, which is now regularly manufactured by the leading dry battery manufacturers of the country, will appeal to every telephone man in the country as **Ideal!**

Really it's the **logical, common sense way of doing,** and before long the Binding Post type of dry battery must appear as **"out of date"** as a wire-terminal lamp for commercial use would to-day seem!

Patterson Screw Top Type Battery Cells are made like cut shown above, with no projecting Binding Posts or carbons; they are mechanically and electrically correct for **every purpose where a Battery Cell is used.**

STANLEY & PATTERSON
Sole Manufacturers of Holders Only
23 Murray St., NEW YORK

NOTE—Keep on using the **same make** of Dry Cell you like best, but when ordering, specify "Patterson Screw Top' in place of Binding Post cell.
All leading manufacturers of dry batteries will supply this type of cell.

Wall Set Fitted with Local Battery "Screw Top" Equipment

THE WESTINGHOUSE STORAGE BATTERY

Ask for Catalog 256-J

The Westinghouse Machine Company

Storage Battery Department
East Pittsburg, Pa.

Gould Telephone Storage Batteries

DESIGNED with a full understanding of the conditions of telephone service and built electrically and mechanically to meet these demands.

Gould Storage Battery Co.

MAIN OFFICES: 341-347 Fifth Ave., New York City
Works, Depew, N. Y.
SALES OFFICES: Chicago—Rookery Building
Boston—89 State Street
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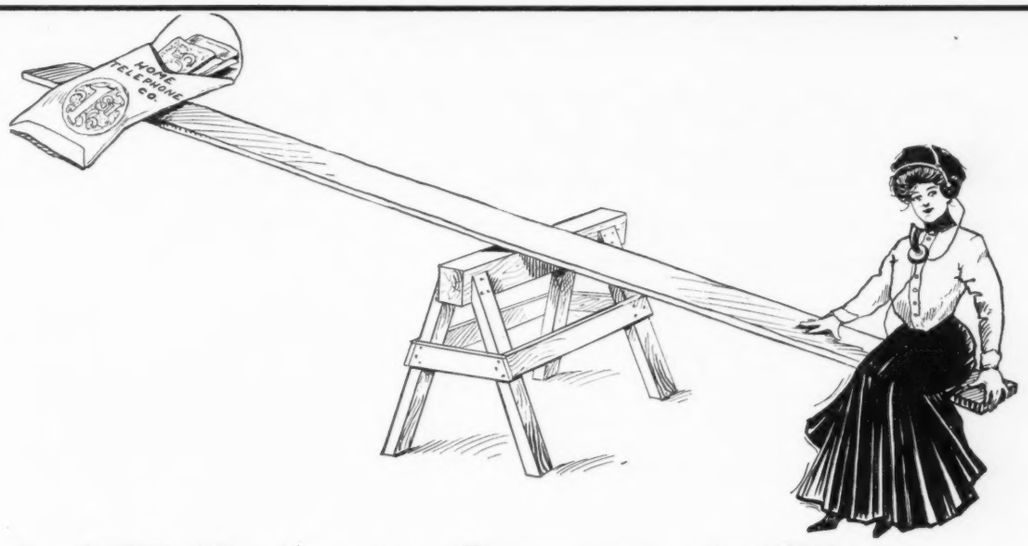

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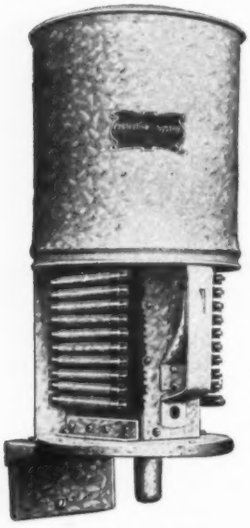

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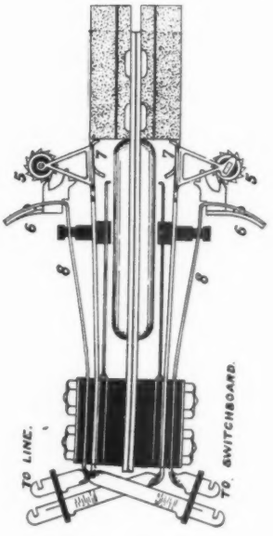

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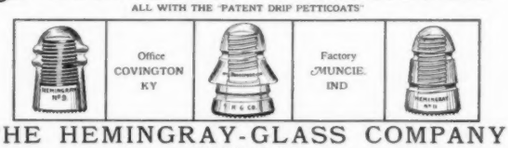

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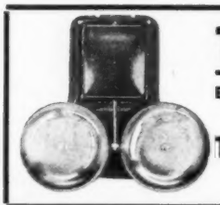

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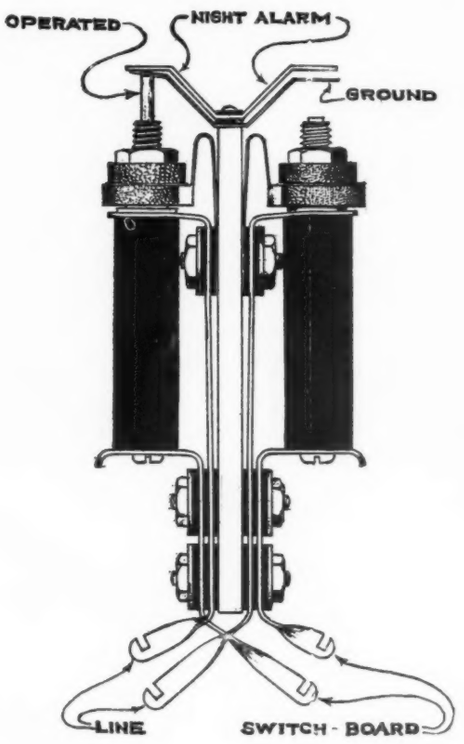

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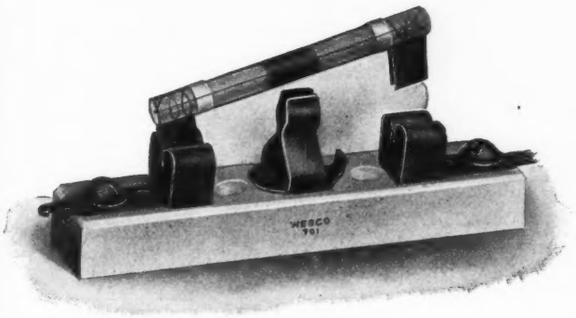

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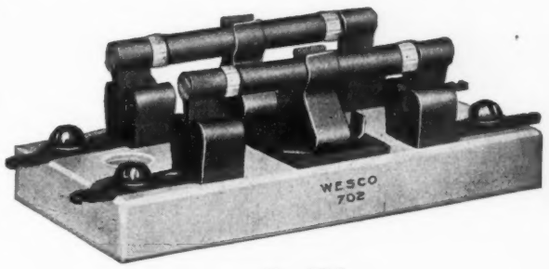

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"PIONEER MANUFACTURERS OF TELEPHONES AND PROTECTIVE DEVICES"

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The Weston Wire Chief's Voltmeter, Model 57, is an instrument specially developed with reference to the requirements of Telephone Companies. With it the Wire Chief is enabled to make rapidly and accurately a large number of the tests of lines necessary to locate the nature of defects and assist him in bringing and keeping the system under his charge up to the highest possible point of efficiency.

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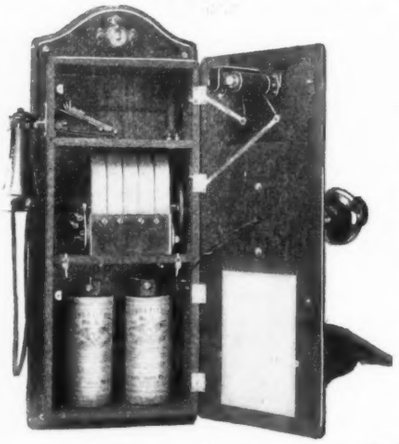

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Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Sound Waves, Telephone Magazine and The Telephone

Vol. XVI | CHICAGO, SATURDAY, DECEMBER 12, 1908 | No. 18

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CHICAGO, SATURDAY, DECEMBER 12, 1908

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Simplified Construction Specifications.

Valuable emphasis is laid, in Mr. Stanton's paper presented at the convention and printed in other pages of this journal, upon certain points which divide proper construction from merely strong and durable building of telephone lines. One of the best points is that a man may erect a line which will weather any storm and yet turn out a job which must be rated as a poor one. The reason is that the line costs too much. In spending too much money to hold up his wires, the construction foreman puts an unnecessary drag on the directors' office.

Mr. Stanton's paper is valuable not because it draws attention to this common fault in methods, but for the reason that he shows why it exists, and along what lines we must work to do away with it. He clearly states that his paper is by no means a summary of the investigations of the committee appointed by the Iowa Independent Telephone Association, of which he is a member. But so far as the method of attacking the proposition before the committee is apparent in his discussion, it is decidedly worthy of commendation. It means that this committee does work which will put in the hands of a man in the field information which he must have for doing the best work, but which it would take him months to figure out for himself. Better still, it is to be put before him in such form that he can apply it on the job at an instant's notice, and so simply stated that he need not even know how the result is obtained in order to make a proper use of it.

It is apparent that the committee is confronted by many difficulties, and it would be too much to expect an extraordinarily high percentage of accuracy in the tables and diagrams which it works out along the lines laid down. It is sufficient to say that its work fulfills a practical need, and that the results of its efforts, as shown by the present example, are likely to be expressed in a practical way which will help construction men to build well at a proper cost. In its future work upon this broad subject it has been chosen to discuss, this committee deserves generous support from any persons whose assistance it may seek.

Mythical Telephony.

Somewhat over a year ago we recorded the successful opening of a cable beneath the waters of Lake Constance. At last some inkling of this achievement in subaqueous

telephony seems to have sifted out to the newspaper world, and enterprising reporters are projecting their imaginations upon unwonted excursions. The lengths to which a good newspaper will go in handling an unfamiliar subject is well illustrated by the following from the St. Louis *Times*:

"We have a report from Milan which says that certain experimenters have succeeded in telephoning from Genoa, on the Mediterranean Sea, in Italy, to Buenos Ayres, on the South Atlantic Ocean, in South America. Quite a long space this, as your geography will tell you.

"The account proceeds to say that the telephoning was done by means of a submarine cable stretching between the two cities. An officer in the Italian army is responsible for the discovery which made this extreme example of long distance telephony possible. The inventor confidently predicts that within a comparatively short time we will be talking across the Atlantic.

"Who is there to wonder? Fifty years ago, had anyone told any one else that in this year of grace, 1908, we should be talking through the thin air by wireless telegraphy or that we should be talking at all, with or without wires, he would have been taken straightway to the foolish house. Nothing, however, is really wonderful.

"The fact of life and death is infinitely a greater marvel than the electric light or the telephone or the wireless telegraph. The difference is that, throughout the ages, humanity has been accustomed to the phenomena of life and death and, therefore, refuses to be amazed thereat. It will, however, elevate its eyebrows in astonishment upon learning that some enterprising Italian has telephoned from Genoa to Buenos Ayres. And why shouldn't he? The marvel is that the thing was not done sooner."

And this from Missouri! Swallowed, without mastication, hook, line, and sinker!

What Can You Do?

At the present time this question is being asked of every man more insistently than ever. The time is past when mere nerve and bluff can take the place of substantial ability. Never before have there been so many goods sold on the "satisfaction or your money back" principle as now. And the test applies to men as well as goods.

Chancellor Andrews, of the University of Nebraska, once said that every student ought to make something. No matter what it is, it should be something that he can call his own product. And he is right. The various shop courses in engineering schools are not intended to make finished carpenters or foundry men of the students. Many get only a good notion of how this kind of work ought to be done and do not acquire the ability to do it themselves. This may be well enough in general, for in four years there is not time to become master of each of the mechanic arts. But every man should feel the necessity of becoming master of something; to say truthfully that there is some useful thing which he can do and do it well. And it should be his ambition to do it better than any one else. The more difficult the proposition, the more alluring it should be.

The manufacturer in these days has to back up his goods by actual performance. Mere "talking points" may sell the first time, but the goods will not stay sold, and repeat orders will not come in. With regard to your own product, your ability, do your goods stay sold? Do repeat orders come in?

To be definite—

Can you clear a bad case of trouble which other men failed to get?

Can you erect a good pole line, one which will be sightly and secure after ten years of service?

Can you pacify an unreasonable subscriber, show him where the difficulty lies, and send him away a friend to the company instead of an enemy?

Can you handle men? Can you get the work done thoroughly and on time without being a grinding taskmaster? Can you command the respect of your men by reason of the fact that you know the business, and yet give due weight to the opinion and advice which they offer?

Can you look over a proposed job of work, get familiar with all the details, and estimate fully and completely the necessary materials and be sure of your results?

Can you take an unfamiliar subject, find where information is to be had, look up references (men, books, and things), digest them, and make a readable and reasonable report on it?

Do you have to have some one at your side every minute to tell you what to do next? Can you take up the line of work which falls to your lot and follow it consistently till you get results?

Maintenance a Study in Humanity.

When the men who do maintenance work get so that they can think in terms of results, as these appear to the man at the head of the system, they have arrived at the secret of efficiency. Mr. Ainsworth's convention paper takes up a subject that has always harassed the manager and the superintendent of maintenance—namely, how to reduce the cost of labor for maintaining each telephone to the lowest practicable figure, and at the same time secure a quality of work which will permanently keep the plant in first-class condition.

The idea of enlisting the personal interest of each worker in a particular district, for which he alone is made responsible, is an excellent one. And in all exchanges where proper care is exercised in the selection of men, and in giving them early training for their duties, this plan probably works out as well as it does in Mr. Ainsworth's exchange at Dayton.

Of course the corollary of such a system is a scheme for reporting which shall come as near to being self-checking as possible. When the force starts in with an enthusiasm for good work it ought to get up a lively rate of speed, and if it also has a knowledge that the shirker cannot conceal the evidence of his misdeeds, nor avoid punishment for them, the amount and quality of each man's work are bound to make a good showing.

Telephone Competition*

By Gansey R. Johnston

The forces upon which we must rely for the proper conduct of business are individual character, social character, competition, and law. The first two being imperfect, the last two are needed to supply some of their deficiencies.

In the telephone business it is thought by some that law should be invoked to supply all the deficiencies it can; by others, that it should only attempt to supply what it can after competition has done its share. In most of their phases, law is a negative or prohibitory force; competition, a positive or active force.

Competition is the normal rule of business. It is a force that has made for honesty, efficiency, economy, productiveness, and progress. In its application are certain faults. There are some exceptions to the rule. I shall attempt to show that the telephone business is not among the exceptions; that some of the faults may be removed without destroying the competition; and that others cannot be removed even by destroying the competition. I shall attempt to show that there is no other alternative for well-meaning telephone companies or for the public, that offers them more at a less cost than competition.

There is need for such a showing. The telephone companies which we represent have allowed their proper position to suffer from the fallacy of accent. They have put the emphasis upon their opposition. They have justified themselves in this so strongly that others are coming ahead of them in the questioning of their proper permanent position. Their business opponent is engaged in building up a widespread public feeling that the opposition has served its purpose, and the next stop is co-operation. If, in our judgment, such a move is unwise, it behooves us to formulate and express that judgment.

Competition is the rule of all vegetable and animal life. According to the theory of evolution, it has been the most potent factor in producing variety and improvement in the forms of individual and social life. The instinct without which there is no life at all, is the selfish instinct. The condition under which practically all life is lived is a condition of greater needs than of means to supply those needs. There is not enough food to bring to maturity any generation of all the seeds that are sown and animals that are born. Those that have obtained a sufficient share to grow upon have been fighters, overcoming large numbers of their competitors. Those most able or otherwise most fit have been the ones to survive. This necessity for insistent selfishness has been modified somewhat in human life, largely by the increasing ability of man to enlarge the food supply, and to restrict the multiplication of mouths demanding food. Kindness has grown out of the opportunity to be at once kind and alive. Nevertheless the rule of living remains a modified selfishness. This is not so bad as it sounds. There is an enlightened selfishness in the affairs of men when the individual and the society are best served by the prevalence of justice, and honor, and benevolence.

So much by way of noting that the part which competition plays in business is related to the part which it plays in everything. So long as there is not enough of any desirable thing to go around, so long will there be contestants for what there is. Some will get it, and some will not. But this again is not so bad as it sounds. Men may fall short of getting all that they work for, and still get much. For one thing their habits of work and endeavor have been so developed that they often take more pleasure in the effort than in the achievement. "All things that are," says Shakespeare, "are with more spirit chased than enjoyed."

The competition between telephone companies for business has this to mark it off from most competition; usually both competitors have gained, instead of one gaining and the other losing. After Graham, Bell and Elisha Gray contended in the courts for a patent-right, Bell had it and Gray had it not. When the Bell telephone companies came into competition for the subscriptions of the public, they found that their competitive labors brought them greater results than their non-competitive lassitude. The supplying of the demands which they had previously neglected produced a new and growing demand. The improvement of their service disclosed new means to improve, and still further enlarge the public demand for instruments. The enforced reduction of their charges brought greater increases in their revenue. Dealing on a larger scale and striving for further expansion brought increases in their sense of public usefulness, and enhanced the number, skill, and interest of their employees. Study brought forth inventions and economies. On the public side the usefulness of this system was amplified by the multiplicity of its connections, the betterment of the service, and the reduction in the charges, besides the new-born attention and courtesy of the workers. Like gains were made by the public through its ability to deal with the new competing companies. All the gains by these companies were new. These gains, of course, have not always and everywhere been made. But it seems a safe, broad, general statement that when they have not it has been due to the folly of one company or the other, not its lack of opportunity.

The question is raised for us to meet, whether, now that ways have been pointed out for reductions in cost and advances in utility, some of the competitive drawbacks cannot be removed without sacrificing the competitive advantages. It may be agreed that the unification of the systems in a given community would augment their value. The question is whether such additional value may be had without too great cost or risk. The question divides itself into two parts: first, the effect of the removal of the competitive spirit upon the human element; and second, the effect of the unification and enlargement of the service upon the essential costs.

To the first consideration we need give brief attention. The removal of the competitive spirit would have a deteriorating effect upon the human activity and efficiency. No substitute for that spirit can be reasonably expected.

The fault with monopoly, we say, is hoggishness. The faults displayed most plainly in competition are those of the unscrupulous and the ignorant, or, if you like the figure, the traits of the fox and the goose. The direction of human purposes by such animals as these is not the fault of any form of industry; but the form of industry may be such as to give them exceptional opportunities.

To exemplify these points without endorsing the correctness of the epithets, I may suggest that the Independent interests are disposed to say of the Bell interests that they are unscrupulous; and the Bell of the Independents, that they are ignorant. We may agree at once that there is no easy or well defined way of meeting competition that is entitled to these designations. If an Independent company has rates too low because it knows no better, then the solution of this problem for its competing Bell company is

*Paper presented at the Convention of the International Independent Telephone Association, December 1, 1908.

just as difficult as it is for an Independent company when its competitor makes rates too low because it is trying to drive out a financially weaker competitor, hoping to recoup itself later. All the advice that can be given to the knowing or the fair side, is to exercise its best ingenuity to keep alive and prosperous up to the period of failure, or education, or conversion of the competitor that is from day to day losing its own strength.

What I wish to point out is, that such problems as these are part of the problem of life. I think that is a judicious comparison when I say the difficulty is substantially the same as some of our political divisions have in dealing with unscrupulous or ignorant executive, legislative or judicial officers. Something is to be accomplished by method. We are disposed to believe that our method of competition in politics is the best that has been devised, and through its operation we get, on the whole, about as good a government as we deserve. The complete remedy lies, as first pointed out, in building up a higher standard of individual and social character. In business we expect to get through competition about as good results as we deserve.

It is a safe inference that, with their experience, telephone companies are becoming less ignorant. There seems to be hope that those phases of the Bell competition to which the Independents object may depart.

The present course of the Bell company in the efforts to monopolize the business has, so far as I can see, no profitable consummation except through victory. The Bell, in places, is spending money in large amounts, is taking on unprofitable connections, is losing opportunities for profitable business, is depreciating the value of the entire telephone business in the minds of the public and in the minds of investors. By all this it has nothing to gain except through the accomplishment of its main purpose. We believe that the Independent telephone companies will not be overcome, that they are too strongly entrenched, both by the character and extent of the business they have developed, and by the strength and character of the men they have developed. The Bell companies have been noted in the past for wavering policies. They have been working at times, not only on foolish policies, but with no policies at all, except such as come from the initiative of the subordinates. There is reason to believe that the policy which now makes so much trouble, and costs both interests so much in expense, may be seen by them to be fruitless, and may be changed to the policy of taking care of their share of the telephone business.

I will digress just a moment to question what the underlying purpose of the Bell interests may really be. Not to buy out the competing plants, for they have not and can't get the money. Not to stop wasteful warfare, for they can stop that by stopping it. Not to effect economies in the business operations, for they have not shown a sense of economy. Not to please the public, for the public is not particularly fond of monopoly. Contemplating these and other considerations, I may say for myself that I come to no better conclusion than that the Bell policy, as always, is no policy, but a blindness and a confusion.

On the assumption that the two telephone companies should come to the conduct of their business as competitors in good faith, and for the sake of argument waiving the effect of the competition upon the human element, have we good grounds for belief that the division of the telephone-using public into two parts is both economical and desirable?

As bearing upon this I will cite four classes of calculations which I have prepared and published, inviting criticism, but without receiving so far any criticism which overturns their conclusion.

The first was a statement based upon actual telephone rates in the city of Columbus from the beginning of competition in 1900. For about five years the Bell company maintained its old rates and then made a substantial reduction. To the close of 1907, the users of the Independent telephones had saved by reason of their paying Independent rates instead of Bell rates, a total of $664,000. The saving for the year 1908 will be about $60,000. Each company now has about 12,000 telephones. The saving to the Bell users in the three years they have enjoyed the reduced Bell rates is not easy to determine, but it must be well above $150,000.

The second phase of this statement showed the present saving to the community on the basis of these rates to be about equal to the amount paid the Independent company for telephones duplicating Bell telephones. The community is paying no more for the existence of the two telephone systems than it would be paying the Bell system for a like number of connections on that system alone at its present rates. We have the opportunity of judging whether the power of intercommunication between all these connections on the part of those who do not now enjoy this power through having both telephones, would be worth the risk of higher rates, poorer service, and slower progress. The tabulation leading to these results appears in TELEPHONY of October 10, 1908. Similar results have been obtained by applying similar comparisons to other cities.

Third: As showing that there is no propriety in the use of the word "duplication," as applied to competing telephone plants in the ordinary community, various sample forms of construction were reduced to costs and comparison made between getting the same number of subscribers on one system and on two systems. The percentage of excess cost of two lines over one runs from 10 per cent to 19 per cent on different samples. What seemed to be the fairest showed 16.3 per cent. This would amount to no more than 17.4 per cent of duplicated investment on account of 15 per cent duplication of subscribers.

Fourth: Another line of calculation was designed to show the effect of combining two local exchange plants each with switchboards of 4,800 lines in use. The effect of this calculation is to show that the result in additional investment and service would involve enough additional costs to require an increase in rates in order to maintain the profit shown by the separate systems. So far as I have known of any such combinations, they have been followed by increases in rates. Some companies which have had the question brought to the point of consideration have figured the same problem through and come to the same result. The figures for these last two calculations appear in TELEPHONY of Nov. 7, 1908.

There is a form of calculation which I have not made. Take the problem of any important city with no telephone service at all, and estimate whether it would be cheaper in the balance of construction, maintenance, operation, administration and other expenditures, to supply the community with telephones on one system or on two systems. Taking the human element into account, we believe that the division between competitors produces the better results. Eliminating this consideration, as before, and assuming that the public understood the matter clearly and did not intervene against its own best interests, the question is whether the division would not be sufficiently economical to offset the measure of real need which the bulk of the public has for a unified service. Such indications as I have studied are in this direction.

The question may be asked whether there is business enough for the two interests. The answer is that there is plenty in all the important cities. A discussion as to where to draw the line between a city in which competition pays and a village in which it does not pay need not delay our argument. If there are two competing systems with local

exchanges in the cities, and toll lines and stations covering the territory generally, there is such a condition of competition as should yield the proper check upon the company's service in those communities in which there is no local competition. If such companies go very far astray from a fair treatment of the public they may expect the potential competition to become active.

In argument upon telephone competition we find ourselves confronted with the mention of exceptions to the success of competitive methods, as in the railroad, street railway, gas, water, and electric light industries. We are called upon to show the relationship of the telephone business to these. By some the comparison goes no further than to say that these all are public utilities, the telephone among the rest; and so many public utilities are monopolized that the telephone must be so. Others go only so far as to conceive the telephone service as a municipal service, and to judge that to be the determining element in making gas, water and other municipal services monopolistic.

The fact is that the economic monopolization of any such industry is dependent upon a number of conditions, of which the telephone has some, but not all. The railroad business, it is safe to say, is in a class by itself. I wish to show that the telephone business likewise is in a class by itself.

The industries mentioned are alike in this, that they all give service from a plant which has fixed limits, is not movable, and may not be diverted to any other uses. Interest, repairs and depreciation on the plant form a large element in the cost of the output; but with this important difference, that whereas in all of these other industries the company sells service rendered through the plant, the plant cost represents so large a proportion of the entire cost for the telephone company that it rents its plants and throws in the service as not being of sufficient consequence to take account of in its charges.

This difference is due primarily to the fact that the plants of the other industries are mostly generalized, and of the telephone business mostly individualized. A passenger occupies in a car, to the exclusion of others, only his sitting or standing room. The consumer of gas or electric light uses for himself only certain short pipes or circuits which are inexpensive and which in most cases he has paid for himself. The telephone subscriber has for himself the exclusive use of his instrument, his switchboard unit, and his line circuit. The sum of the parts used by the individual subscriber makes up much the greater half of the cost of a telephone plant.

The general portions of these other plants are so susceptible of providing for an increased service that the securing of such increased service means an increase in revenue much more rapid than the increase in expense. Telephone service in many of its phases means increase in its expenses greater than the increase in revenue from an enlarged business. It is not essential in order to mark off this business from the others to insist upon this point. We can take that portion of the business which has the most gain from increased traffic, namely, the long-distance service, and show that its opportunity is limited so early by the capacity of the plant as to keep it from getting into the same class with these other industries.

The street car company, for example, can run over the same track from one to five hundred cars a day, and carry from one to one hundred and fifty passengers in each car without increasing its expense per car very greatly, or its expense per passenger greatly. A telephone toll company cannot put over its circuits more than one message at a time, and not more than eighty messages a day.

So long then as service given through a single plant does not exhaust that plant, the construction of a competing plant to render the same service is in a high degree wasteful. It is the condition of such a business as we illustrate by the running of cars over a track. It has already been shown that this condition of waste does not exist in more than small degree in telephone plants.

A measure of gas from one gas plant is much the same as a like measure of gas from another gas plant. There is not much by which gas companies can compete for patronage from the same public except in rates. The history of the competition by gas companies has been that the stronger company has contrived to force its terms upon the weaker company. The history of the telephone business has been that choice between companies has not usually been determined by the rates except where the rates of one company or the other were excessively high. Companies exist and thrive side by side with considerable difference in their rates. This is because they offer differences in service or connections which are more important than difference in rates, or because the more desirable company may not be able to furnish all the connections in request. Changes from one system to another are made slowly if at all in response to the cutting of rates. The company which begins the cutting is seldom strong enough in the extent of its service, or in the strength of its finances, to hold out long enough to accomplish its purpose. It is much more likely to lose than a concern which can cut rates one month and restore them the next.

The competition is more for the favor of the public to yield the companies additional business or such as is needed to permit them to thrive. It takes its course in the way of better service and treatment, improvements and economies in methods, extensions in territory, additions in existing territory, the supplying of particular classes of the public, more and better toll connections. In a way in the telephone business there has been a competition for funds with which to build. Neither interest has on the whole obtained a sufficient supply of funds with which to meet the public demands, even though their funds have been drawn for the most part from different sources.

In all these respects competition has brought about larger advantages to the public. There are some companies which have not succeeded in obtaining a full measure of recompense for their share in serving the public. Some of these are disposed to lay the blame for their condition upon the competitive element, and to believe that their remedy lies in combination and public control.

The subject of combination is too large for me to enter upon within my limit of time, more than to say that such calculations as I have made and have embodied in another writing all go to show that the telephone business does not contain those elements of costs growing out of separation of plants and competition for business which is not large enough to go around, to make combination a means of effecting any material savings.

To go briefly into the subject of public control, I may mention again that the nature of law is to be negative or prohibitory. It may be expected to accomplish more in the correction of abuses than in the upbuilding of industry. The law is, or should be, a conservative force. What is needed in the telephone business is not conservation but development.

Apart from the reduction in rates, could administrative public officers have brought about the gains we have credited to competition?

Raising of funds? Wherein would the state help? And without funds, how much can be done?

Better service? This is hard enough to pursue under the spur of competition; it would be easy to drag back upon under all the spurs the state might yield.

Improvements and economies in methods? Only those which might be palpable. Not those which the business has needed and still needs—the technical and inventional progress and the careful study of the multiplied details.

Extensions into new territory? The state might force one long step—that is, the combination of or connection between competing companies as they now exist, and then see the busi-

ness stop still or go backward until it might recover from this damage. Other steps would depend upon funds.

Better educate the people to special needs of particular companies, as in higher rates or relief from burdens? Probably, but not certainly. It might simplify the problem but not solve it.

Concerning the costs of competition: There is no occasion to try to balance these carefully. They are necessary costs, as are the costs of legal administration, or, metaphorically, the costs of a police force. There are some of us who believe that the cost of adding to the duties of our different divisions of government are not only measured in their money or tax costs but also in their losses to the people through the leaving of other and more important duties unfulfilled. We don't like to see the state undertake much more. It is now leaving too much undone. All that it safely can, it should leave to be dealt with by the force of competition.

Economical Development of Toll Territory*

By Frank F. Fowle

Consulting Electrical Engineer.

The purpose of this paper, as the title suggests, is a consideration of the principal factors in building up and developing a toll plant on a dividend paying basis. There are naturally two divisions of the subject, namely, the projection of an entirely new plant in undeveloped territory, and the development of a plant already in existence; but the latter division of the subject grows out of the first and undeveloped territory will be assumed as the starting point. Were there no previous experience in the toll business to furnish guidance in laying out a new plant in undeveloped territory, it would be necessary to proceed with the utmost caution; in fact, the whole development would necessarily be experimental and would involve a large financial risk. But it is now possible to predetermine, from previous experience, the volume of business to be expected under any given set of conditions, with a degree of accuracy that reduces the financial risk to a parity with that in any other business of furnishing public service.

It is found that the public demand for toll service occurs in such ways that certain laws may be formulated which will express mathematically or graphically the volume of message traffic which will occur on the average under any given or known set of conditions. The design of a toll system divides itself naturally therefore into two parts, first the predetermination of the traffic, and second the layout of a plant which will provide the necessary facilities in the most economical manner; under the system of rates charged, or to be charged, it becomes apparent at once what portions of the proposed plant will be profitable at the outset, or, if the rates are not settled in advance, an estimate may be made of the plant charges and the operating costs to handle the traffic, as predetermined, upon which may be based a system of rates which will insure dividends from the outset.

After the plant is built and in operation, its proper development requires a perpetual observation and study of the traffic, both as to volume and speed of service, so that the rate of growth may become known and the need of additional facilities foreseen in sufficient time to provide them before the traffic congests sufficiently to materially impair the service. The rate system and the amount of the rate charged are of paramount importance in predetermining the volume of traffic and in designing the plant; therefore the first subtopic deals with this subject.

TOLL RATE SYSTEMS.

Early authorities on economics have defined the rate-making principle to be that of "charging all the traffic will bear," referring now to traffic in business of any sort, but when that definition was made there was no such thing as supplying public service on a large scale, competition was free and unrestricted, and monopolies, trusts and combinations in trade were unknown. The volume of business has been constantly growing with the development of the country and with the increase in population new conditions have come into existence, competition has become restricted in many ways and combinations in trade and industry have sprung into existence.

The supplying of public service has now come to be a vast industry, absorbing great amounts of capital and employing millions of persons, so that in a country as densely populated, as wealthy and as well developed as is ours today, the demand for public service of all kinds is stable and uniform. The risk to capital, therefore, in entering the business of furnishing public service of one or another sort is not an undue risk, and there is nothing inherently weak or faulty in this field from the standpoint of safe investment.

Along with the rapid development of our business and commerce, there has been a growth in the average of intelligence among our population and the people have become keenly suspicious of the motives behind great combinations in trade and industry, as regards the effect upon the prices of commodities and necessities which are consumed by the public generally. While not among the absolute necessities of life, such utilities as gas, electric light, transportation and telephone and telegraph service, commonly classed as public services, have become nearly indispensable, if not wholly so, in our modern economic and social existence.

The public, partly through suspicion of public service corporations and partly through a belief in the common fairness and justice of their plan, have demanded that public service rates be made upon the basis of "cost plus a fair return on the actual investment." In one sense this may be regarded as a new principle in rate making, but from the standpoint of the old theory this is the maximum rate which the traffic will bear, because there is no demand from a majority of the consumers at any higher rate; it is also the minimum rate which the traffic can bear and at the same time exist profitably.

It becomes necessary to settle upon what constitutes the actual investment and also what constitutes a fair return on the investment. All legitimate expenses for securing franchises, rights and licenses are properly a part of the actual investment and as necessary as expenditures for the physical plant itself; this is also true of the expenses incurred in disposing of the company's securities, including discounts, commissions, advertising and incidental expenses. The first cost of the physical plant is the major portion of the investment; added to it will be the first cost of plant enlargements or extensions as they are made from time to time, but no expense for reconstruction, which is chargeable to the current expense of conducting the business because it is the outcome of depreciation and represents no increase in the plant or its earning capacity. In many discussions of what constitutes the actual investment no acount is taken of those expenditures for the intangible property mentioned above and it is held that the investment in physical plant constitutes

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the entire actual investment. This is manifestly unfair, as any unprejudiced consideration of the matter will lead one to see. It is unnecessary to go into the detail expenditures for plant, as they are universally classed in the actual investment. What constitutes a fair return on the investment is very likely a matter over which there are many honest differences of opinion at the present time, but it may be laid down as a sound proposition that no concern can be regarded as in good condition financially whose net earnings do not leave a fair surplus or margin after the payment of dividends, to meet unforeseen contingencies and offset lean years. It is assumed, in making this statement, that operating expenses include not only the usual running expenses, but adequate allowances for maintaining the plant, taxes, insurance, legal expenses and an amount adequate to cover the annual depreciation, whether or not it has been actually spent in reconstruction. The dividend rates of railroad, industrial and public service corporations average from five to seven per cent—sometimes lower and occasionally higher. One large public service corporation pays eight per cent and another until recently paid ten per cent. The latter rate is believed to be too high where there is so little risk from any serious falling off of the public demand and the company is practically insured against loss of business from the establishment of severe competition in rates or service.

It is a generally accepted principle that the investor is entitled to greater returns as he assumes greater risks; a return of six per cent is believed to be generally regarded as fair on a conservative investment and four or five per cent on an investment practically free of all risk. Total net earnings of eight to ten per cent on the legitimate, actual investment of a public service company are believed to be fair and conservative; less than this can hardly be demanded without granting to the company special compensating advantages. On the other hand, the general law of supply and demand affects the price of capital just as it does other commodities and the returns to the investor in telephone securities must be as high as the average if the capital necessary to develop the business is to be forthcoming.

A public service company which enters the field is obligated not only to supply the public demand at the outset, but to develop and expand as fast as the demand increases; any other course invites competition or gives an advantage to an existing competitor. Additional capital, therefore, will be required in the future from time to time, and in order to obtain it on fair terms the company will have to show that it is in a prosperous condition, having paid dividends and amassed a sufficient surplus to insure that the margin between dividends and net earnings is not dangerously small. The rate-making basis which has been used in the subsequent consideration of the subject is cost plus a return of eight to ten per cent on the actual legitimate investment. Returns of five or six per cent are probably fair during the first year or two of operation; however the returns should increase thereafter to the figures before stated. It is assumed that the plant has been laid out on a sound engineering basis, after a proper study of the territory has been made. It is recognized, nevertheless, that there are instances in which the rate of profit during the first few years has gradually diminished with succeeding years, due partly to laying out plants without regard for future growth and partly to the failure to charge off depreciation annually, from the commencement of operation.

Turning now to the discussion of the rate-making principles which are peculiar to the telephone business, it may be observed that the telephone business is comparable with the railroad business in the sense that both are transportation, the former of intelligence and the latter of goods and passengers. Transportation rates comprise two factors, the length of haul and the rate per mile; in thickly populated communities, zones are established within which a flat price is charged for any haul. This is best exemplified in urban street railway systems.

Precisely similar is the generally accepted rate basis for telephone service; in local exchange service a zone is established within which any connection may be had for one and the same price, under measured service or flat rates, but between telephones situated not in the same zone but in different zones any distance from each other, a toll rate is charged, that is, a special charge for each connection. The two elements entering into a toll rate are the length of haul, or the distance between zone centers, and the length of conversation. No elaborate discussion is needed to show that these two elements must be the factors in any schedule of toll rates which is non-discriminatory in its character and as nearly fair to all alike as it is possible to be.

The mileage basis must prevail if each community is to enjoy fully all the natural benefits and advantages which accrue to it by reason of its geographical location with respect to other communities and this basis is consistent with the principle of cost plus a fair return on the investment. The principle of graduating the rate in proportion to the length of conversation insures a distribution of charges in proportion to the amount of use; otherwise the charge must be based upon the average length of conversation, with the result that the user whose conversation is shorter than the average bears part of the burden which should rest on the user whose conversation is longer than the average; nor does this equalize itself in the long run, because all users do not make an equal amount of use of the service.

There should obviously be a uniform method of reckoning the mileages and it is believed that air-line distances form the most equitable basis, except in the event of encountering some great natural barrier, such as impassable mountains or very large bodies of water, which necessitate special forms of construction or detouring the obstacles entirely, either result increasing the cost and warranting an increase in the rate. Highway mileages are not so satisfactory as air-line mileages for several reasons; low grades in highway building are always sought, so that distance may be voluntarily or even necessarily sacrificed to avoid excessive grades; moreover highway distances are frequently affected by rivers and swamps, which necessitate detours. Railroad mileages are also objectionable for the reasons just mentioned; pole lines can be built and maintained over routes where highways and railroads are impossible, therefore the air-line mileage basis, with the one exception previously noted, appears to be logical and equitable. It may rarely be possible to build a pole line along an air-line route, but the average increase of mileage caused by deviation therefrom will be small unless a detour is purposely made, to touch some intermediate exchange or toll station. The air-line rate principle will promote the building of pole lines along the shortest feasible routes, thus keeping the line investment at a minimum, insuring the lowest equitable rates and therefore the maximum development.

The so-called "Country Rate System" is a zone system, in which the political division of territory is taken as a rate zone. Quite commonly toll connections between all points in a county are established for one rate; where counties are thickly populated or of great area, the zone becomes too large and a reduction in size is necessary. This brings up the question of the proper size of a rate zone, which is too extended a subject for exhaustive discussion here. Emphasis may be given, however, to the evils resulting from unduly large zones. When a zone is so large that the difference between the theoretical mileage rate for the maximum haul and the similar rate for the minimum haul is considerable, both hauls being within the zone, a double injustice will result. First, the short haul traffic within the zone must bear part of the burden which should rest on the long haul traffic, because the same rate is charged for toll

service between all points within the zone, regardless of the haul; second, a higher toll rate must be charged on traffic which originates in a given zone and terminates in an adjacent zone because the average haul between them will be greater than in the case of two small zones which are adjacent. Between two towns situated only a short distance apart, one in a given zone and the other in an adjoining zone, the traffic must necessarily bear the toll rate which applies to all traffic between the zones and consequently the equivalent mileage rate is very high, because the air-line distance is short. The result will be a suppression of traffic compared with the traffic that would result under an air-line rate. The remedy is smaller zones; the smallest practicable zone is a local exchange district, but in very large cities it may be equitable to subdivide the city into several zones.

Passing to the consideration of the long-haul toll traffic, it will work out that all the zones in a small group or cluster will take substantially the same rate to a zone many miles distant, spanning a large number of intermediate zones; this principle may be stated in this form,—as the length of haul increases, the rate zones may be enlarged. This may be recognized by creating major and minor zones, the latter being subdivisions of the former; short-haul rates would be established upon the basis of minor zones and long-haul rates upon the basis of major zones. For example, all the telephones in Cook county, Illinois, might take the same rate to St. Louis, but within Cook county there would be several minor zones between which the traffic would be subject to toll charges.

An analysis of the several elements of cost in establishing and maintaining a toll connection shows a very natural division of cost between lines and terminals, as regards both fixed charges and operating costs. These various elements may be assembled in a formula for determining the rate, as follows:

Let R = the total rate for a conversation of any length over any distance.

Let m = the rate per minute per mile, comprised of interest, depreciation, maintenance and taxes upon the lines and rentals for leased lines.

Let T = the maximum length of conversation permissible without charging for overtime, usually called the "initial period."

Let l = the length of haul.

Let P = the terminal plant charges per connection, comprised of interest, depreciation, maintenance, taxes and insurance upon the toll switchboards, equipment and buildings, the local exchange trunks and the rentals for leased equipment, trunks and buildings.

Let L = the cost per connection of operating labor and traffic management.

Let G = the general expense per connection.

Let C = the commissions paid to toll agents or local companies, per connection.

Let t = the number of minutes of conversation in excess of the initial period, T.

The formula for the rate is,

$$R = m\,l\,(T + t) + P + L + G + C. \qquad (1)$$

Minute-mile rates vary from one-tenth to two-tenths of a cent; the initial period is very commonly three minutes, but has been as high as five minutes and as low as one. The terminal plant charges will vary greatly with the local conditions, but will never exceed a few cents per connection. The operating labor and traffic management costs will vary in offices of different sizes and with different operating systems; a fair range is probably from five to fifteen cents per connection. The general expense per connection should be the smallest individual item in the rate, in the neighborhood of two or three cents per connection. Commissions on originating toll business are usually made a percentage of the rate on each connection, from 10 per cent to 25 per cent, but not to exceed a fixed amount of from ten to fifteen cents.

The choice of the best initial period is a very important matter, because the volume of traffic received between two given points depends to a considerable extent upon the minimum rate. The average length of conversation will vary with different classes of traffic to some extent and in order to develop the traffic from as many sources as possible, it is desirable to make the initial period short,—considerably less than the average duration of conversation for all traffic. Five minutes is probably too long for the bulk of the traffic; an average of about 4½ minutes has been observed where the initial period was three minutes. For short haul traffic, which partakes somewhat of the nature of local exchange traffic, the length of the initial period is not so important, because the rate is low in any event; but in long haul traffic a short initial period undoubtedly develops more traffic than a long period.

Toll calls are commonly classified in two ways, according to whether the calls are made by number or for particular parties; the former is styled two-number business and the latter, particular party business. There is a very large degree of economy in circuit loads and operator loads from handling toll traffic on a two-number basis, rather than a particular party basis; it is practically necessary to handle short haul traffic on a two-number basis and the zone within which traffic can be so handled is limited only by the permissible size of the directory which must list all telephones in the zone, so that subscribers may call by number instead of by name. Under this plan the calls made and not completed will be limited to the cases where the number called is busy or does not answer.

For long haul traffic the particular party basis is practically necessary because in a large majority of cases the person calling desires a particular person at the place called, rather than anyone who may answer the telephone, and because of the large amount of the rate charged the patron does not care to incur the risk of not finding the desired party at or within reach of the telephone. On short haul traffic some companies accept particular party calls at an increase over the two-number rate, of 25 per cent to 50 per cent; but no companies handle long haul traffic except on the particular party basis.

On traffic of the latter class there is commonly a considerable amount of lost business, comprised of incompleted calls, which will vary from 5 per cent to 30 per cent of the total calls received, according to the character of the traffic and the time of year. The percentage of lost business is always high on traffic to summer resorts and places of amusement. If the traffic becomes congested for any reason, such as the holding of large conventions, fairs and exhibits, the sudden occurrence of public calamities, or the failure on the part of the telephone company to furnish facilities to keep pace with the natural growth of the traffic, there will be consequent delays to service and an increase in the percentage of lost business. It has been proposed to make a small charge for an incompleted call or lost call, on the theory that the toll lines have been used to pass the call and the report, and the time of several operators has been consumed to about the same extent as though the connection had been completed; such a charge would be composed of items P, L and G in formula (1). The result would be to make possible a slightly lower rate on the completed calls, but the burden of the cost of handling the lost business is otherwise distributed over the completed calls, which in number are several times the number of lost calls and the burden therefore amounts to very little on each connection. The plan is entirely logical, but it has not been used to any extent and is of doubtful popularity with the public.

(To be continued.)

Some Economies in Handling Maintenance Men*

By J. H. Ainsworth

The Pennsylvania Railway Company has an ingeniously arranged inspection car which is run over its road periodically. Its mechanism records upon a scaled paper tape, in duplicate, the imperfections of its track, the high and low joints, the car swings, etc., and automatically marks the exact spot of the imperfection with a splash of whitewash. The section foreman is taken aboard the car just as it enters his section and, watching the tape, is able to read the imperfections of his own portion of track as the section slides under him, and at the end of the section he gets a copy of the sheet which will guide him to the troublesome spot with accuracy. He is given an average at each inspection, and a prize is hung up for the best maintained piece of track, and woe be it to the "Paddies" if the tape runs against that section. The result of such supervision is evident.

It has been said that the way to maintain a telephone plant is to do it just as the railway company does its track, and this is true within the limits which are prescribed by the differences in the plant conditions. The section men are on the job every day; are on the same section every day, and this should be true of the telephone inspector and repairman, dictated, as I believe, by the consideration of economy and supervision.

It is the writer's observation that, generally speaking, the inspection car is not run over the telephone repairman's section, or district as it should be, and being unable to direct him as the section foreman does his men—"A littel to the Nort', now—a littel to the Soudt'—There, now. Sphike her phwere she loies."—we lose a great portion of his value and the cost of routine inspection trips by a superior or some one especially appointed, comes little short of being an absolute waste.

It will not be contradicted that two men usually work together better than one works alone in every employment that does not afford a piece-work plan of pay, and that is, of course, beyond the pale of telephone maintenance. Hence the necessity of substituting some scheme of supervision which will accomplish, if possible, the end aimed at by the inspection car, which, perforce, we are unable to adopt in this business.

It is hardly necessary to suggest, in the first place that your repairman should be able in his particular line, nor is the consideration of his loyalty to the company and his conscientiousness to his work of small consequence. I have not hesitated, upon finding either of these qualities deficient, especially the last two, to divorce that man from his pay. I'd a bit rather that he was loyal and conscientious than that he be extremely able, for the latter ability will be acquired through the force of his conscientiousness, as a rule, while the former, like teaching an old dog new tricks, is difficult and questionably lasting.

I think it may be charged without particular liability to challenge, that the man who is working as a repairman at an average salary or less, has never, either of his own motion or through the medium of suggestion, discovered the rule that the best paid man is the man who requires the least supervision, or that the poorest paid man is the man who makes no pretense of keeping a record of his own doings or the conditions in his own district for his own information; who plods along without a suggestion that the trouble in his district is growing instead of diminishing; and charges up his over-tired condition at night possibly to lack of sleep during his younger days, or as a sign of approaching age. The chances are, probably a hundred to one, that he is the man who knocks a cross out with a club because it is easier than to climb a pole, and this very thing, like the claim of the medics about stomach trouble and nervousness, that stomach trouble induces nervousness and nervousness causes stomach trouble, keep the poor fellow going around in a circle.

I know it is usual, in larger exchanges especially, to have a man follow around after the line gangs to see that the line wire and drops have been properly erected; to see that no unsoldered joints have been left in the cable terminals, and that often another man is employed to inspect the inside wiring and the condition of the instrument after it has been installed.

Because of the fact that the city foreman is, if he is earning his salary, pretty busy, it happens that, with aggravating frequency, bad conditions which have come up in some portion of the city, and which it has not been the fortune of the city foreman to inspect for some time, only become known to the company through an accident or, more often, through the loss of a patron because of faulty service. And these are some of the economies that the writer has attempted to effect in his own exchange, with success.

To begin with, I called my repairmen together and talked the situation over with them; pointed out to them the manner in which their work influenced the success of the company, especially bringing to the attention of each one the fact that the poorest paid man is usually the man who costs the most for supervision. I suggested to each that his district should be his pride, and that under no circumstances should he allow any condition to be brought into that district or to remain in it, which would tend to hurt the record of his district, without calling attention to it; and that from that day on there would be kept a record not only of the number of cases of trouble in each district, but of the recurrences of trouble in each district, taking the personal pledge of each repairman that he would work after this plan in the interest of the company, as well as his own.

I provided each man with a cover and a supply of printed forms made up in pads, the back of which could be slipped into the cover, this arrangement of cover and form being provided so the forms would be kept in a clean and uncrumpled condition.

The repairman's work report form contains

First, a space for the serial number of the trouble,

Next, the time of day,

" the telephone number,

" the name,

" the address,

" the cable terminal,

" the nature of the trouble reported,

" the nature of the trouble found and the exact location,

" the time cleared,

" the question, "Were repairs permanently made?",

" the number of car tickets from and to,

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In the bottom left hand corner of the form is a note that full report of work done must be shown on the back of the form, and a space for the repairman's signature.

The repairmen are instructed that each item of this form must be made out in full, and the item "exact location" is intended to and does guide us in determining whether the trouble found was a new one or whether it was a recurrence. The elapsed time between the making of the ticket and the clearing of the trouble has been found to be of great value in determining claims for rebate, as well as exposing to the head of the trouble department the facility with which trouble was located and removed.

The question "Were repairs permanently made?" is being answered by "Yes" or "No", with an explanation on the back as to why the repairman could not make permanent repairs. The repairman is given to understand that the company appreciates the fact that there are circumstances which make it impossible for a single repairman to make a permanent repair, and, by providing a particular place where he may report this and with the knowledge that he will not be criticised for making temporary repairs, if he reports that it is a temporary repair and why, I think we have practically eliminated a disposition upon the part of the repairmen to do slipshod work.

More than that, a repairman knows that every case of trouble must be covered by one of these forms, as a score is kept against him of the number of troubles which are turned over to him, and he knows that, in case a circuit is too persistently in trouble in his district, an inspection will be made of each ticket which he has turned in, and that he will be called sharply to task if his work shows to be faulty.

He is further instructed that one of these forms is to be used to report to the wire chief any and every bad condition which is beyond his power to repair. He is to report on one of these forms anything of interest which may come to his knowledge either in or out of his district. This instruction is given for the reason that the employees, especially the troublemen, may hear things which the company should know at once, and which may not come to the company's knowledge promptly enough to prevent loss, and which attention from the manager might prevent. A repairman may hear a subscriber remark that he wishes some certain person had the telephone service. That very remark has, in several instances, enabled us to secure new subscribers.

The inspector is given a ticket each day covering each new installation in his district and he makes a report after an inspection of the installation, and knows that he is expected to criticise any condition about it which is not first class, realizing that he will be blamed if the service installed does not give satisfaction on account of any condition due to faulty installation.

At the end of each day the repairman, if he comes to the office, brings his repair tickets with him. In case he does not he is provided with a stamped envelope, directed to the wire chief, into which he places his repair tickets and drops them into the nearest mail box. Upon receipt of these tickets at the office they are inspected by a clerk. A ticket which is not properly filled out is returned to the repairman and he is required to put upon it all proper record. Upon finding a ticket showing that temporary repairs were made, the clerk makes a duplicate of that ticket which is turned over to a maintenance gang to make the repairs permanently, and upon the return of the duplicate, it is filed together with the original report, the tickets, of course, being filed by dates. A ticket calling attention to anything outside of plant conditions is sent to the manager and the repairman is given due credit for information thus furnished.

In adopting this plan we found it necessary, in order that all repairmen should be upon an approximately even basis, to re-district the city so that each repairman has approximately the same number of telephones to look after.

Coincident with the adoption of this plan we discontinued the employment of two men who had previously been inspecting new work done by the drop wagons and installers, and the plan is working out very successfully. While the repairmen, of course, report direct to the wire chief, I have made it my business, and I believe with profit, to know personally each repairman, and to meet with them occasionally for conference, and all the districts, without exception, have shown a decrease in trouble.

It has taken, as may be easily imagined, some little time to bring about such conditions in a repairman's district as would make it apparent to him that the plan has been followed with profit. It is especially true in two cases, in both of which districts the telephones are scattered over a very considerable territory. It is very seldom, indeed, in these two particularly, that a single case of trouble is carried over from one day to the next, and the repairmen in these districts are having time to make inspections of telephones upon which no trouble has been reported. It is not, from present indications, a far cry to the time when another re-districting of the exchange can be made at a saving of possibly one repairman, and, of course, the lowest man will go, and so surely as that happens the repairman who has brought it about will profit out of the saving thus affected. There is a healthy rivalry among these men as to whose district shall show the best, and that we encourage.

Referring to the records of the number of cases of trouble in each district, this report is made upon a blank which shows the period it covers, having a line for each day in the month with the days shown in figures. Next that is a space over which the heading "Original" is placed and a small column marked "Total"; another space with the word "Recurrence", with another small space marked "Total", and a space for remarks. A sheet is used for each repairman and the wire chief scores by the familiar way of one mark for each case of trouble upon which the repairman is sent, getting his information as to the case being a recurrence from the card upon which the subscriber's trouble is reported. This takes very little of the wire chief's time and shows very readily the conditions in a repairman's territory.

At the end of the month the superintendent of equipment carries these totals to a sheet which will show the totals by months just as readily.

This same sort of check is kept upon our switchmen and the work of keeping these records is not sufficient to require the services of any extra help.

It may be well to say here, that, of course, I am presuming that each exchange which might be affected by this suggestion, has a satisfactory trouble system and it is probably true that there are as many forms of handling trouble as there are methods of bookkeeping in this business, and doubtless each is of the opinion that his method of scoring the trouble is the best. It is only necessary, however, that the trouble system be of such character as will enable the wire chief or a clerk, if one is found necessary, to readily gather the information desired.

We have just provided a form for scoring the amount of material taken out by repairmen from the stock-keeper. Our idea for this is to prevent waste or careless handling. In view of the fact that the repairmen's territories are approximately the same, so far as the number of telephones are concerned, it will be worth our while, I think, upon finding that any particular repairman is using any consid-

erable amount of material in excess of the others, to check his work up. Of course, this check provides as effectually against dishonesty as against carelessness and in the writer's experience the losses to a company through either or both would justify the cost of check.

It is further a well understood rule by the shop and switch men that no piece of apparatus of any kind is to be robbed of any part on account of repairs to another, unless the case is absolutely urgent, and then only with the approval of the superintendent of equipment, and the penalty for violation of this rule is understood to be dismissal. I feel satisfied in my own mind that the operation of this rule in a few years at this particular point has saved the company many dollars.

In checking switchboard men recently it was noticeable that a certain kind of trouble was predominant in a certain board. The switchman's attention was, of course, called to it in the natural course of supervision and, pending the few days that it took him to thoroughly go over his board looking to a reduction of this particular trouble, I had occasion to notice an attempt by him to do some soldering, and it was evident to me, from his manner of doing it, that his eyesight was not what it should be. Upon questioning him I found that he had worn glasses for a considerable length of time, but that no re-adjustment of his glasses had been made for five or six years. He did not seem to realize that his eyesight was not what it should be, although he admitted that his eyes bothered him some, but had put off having them examined anticipating a very considerable bill. I insisted that he must go to an oculist and have his eyes examined and new glasses fitted if they were required. The oculist found that the glasses he was wearing were entirely unsuited; in fact, were really damaging his eyes rather than helping them, and after fitting his eyes with glasses which made him see as he has not seen for a good many years, I passed a voucher for the payment of his bill. I feel sure that the payment of this bill may be classed as an economy.

We have, I believe, another ceremony covering Sundays and holidays, in the maintenance force. We assign the Sunday service in turn to the men, so they are free on Sundays with the exception of one Sunday in about six or seven weeks, and for the Sunday they are not paid, except that during the year they are allowed a week's vacation on pay, the week to be taken either in separate days or altogether, as they may like, it being done, of course, under the approval of the superintendent, so our force is not crippled by it. In this way we avoid the payment of double time for Sunday and holiday work.

It is also a rule here that if one of these employees is sick for a period not exceeding three days, he is not docked on account of such absence, if he can furnish us evidence conclusive that he was unable to be at work. This rule has, I think, more than justified itself through the fact that in case of the company's emergency at night, as in the case of a dangerous fire, these men are not paid overtime at the time and a half rate unless the emergency is such as requires practically all-night service.

We have had one case of discovered abuse of this rule and, as may be easily anticipated, the repairman in question is having his meals paid for now by some one else.

I have insisted with these employees that there must be absolute harmony between them, and have had but one case where it was necessary to release a man in order to secure it.

I am fully cognizant of the fact that to some the suggestions offered will not be new. If, however, the detailing of this plan shall be helpful to a single one, then the purpose not only of the writer, but one of the purposes for which we meet in convention, will have been accomplished.

Standardization of Toll Line Construction*

By W. J. Stanton

There has long been a feeling among Independent operating men and engineers that the subject of standardization cannot much longer be ignored. This sentiment has found expression from time to time in papers read before State and National Associations in their conventions. The difficulties to be overcome, and the objections generally urged against any effort to standardize, have had a tendency generally to prevent any concerted effort in this direction.

Absolute standardization means an arresting of progress. On the other hand, to entirely ignore this problem means to invite and encourage a chaotic condition in manufacture, in construction, and in operating methods, which inevitably places such a burden upon the telephone business generally as to seriously interfere with its development.

The problem confronting us has been, and is, to take such measures, and to adopt such rules and standards as will minimize the condition of chaos which has heretofore existed; and at the same time leave as clear and broad as possible the pathway of progress.

It was with these conditions in mind, and with this purpose in view, that the writer presented to the Iowa State Telephone Association at Sioux City, in 1906, a paper urging that immediate steps be taken which would make possible greater uniformity of construction, operating, and accounting methods, especially as regards long distance toll line business throughout the state; bearing in mind that the ultimate success of long distance operations in the Independent field must depend upon uniformity of methods in every department; for without uniformity, equity is rendered almost impossible, and the harmony necessary to ultimate success could hardly be established.

The Association, seeing the necessity of such procedure at the present stage of development of the industry, appointed a committee with instructions to draw up and publish a set of standard specifications for the construction and equipment of long distance lines, establishing such standards as would best meet the requirements of the industry, and still be perfectly practical for all companies doing long distance business.

This committee has labored intermittently, but conscientiously, for two years, until the work has taken a definite form in the shape of an outline for a volume of standard specifications covering toll line construction material and methods, which it is proposed to publish in handbook form for distribution to operators in the near future.

The proposed work will take up in detail standard construction material, setting forth such specifications as are approved by standard authorities. In so far as it will deal with material only, it will not differ in many respects from standard works, but will rather be a selection and compilation of such standards as seem to the committee best adapted to conditions as they at present exist in Iowa, and adjacent states. Data including detailed sketches of standard parts, tables covering strength of materials, etc., which may be necessary for specifying and determining the properties of such material, will be provided. It is proposed, also, to provide such tests as may be necessary

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and practicable to be applied by operators under ordinary conditions.

Wherever there is legislation concerning rights of way, road crossings, railroad crossings, etc., it is proposed to furnish such references, and publish such specifications as may be necessary in order to comply with the provisions of the legislature or legislatures of the state or states using these specifications. In dealing with construction methods, the committee makes no attempt to specify the manner in which work shall be done, except as such methods have to deal with the finished product. In other words, the committee will deal rather with results to be obtained than with the methods of obtaining results.

In other investigations along this line, the committee finds it necessary to go further, and more into detail in matters concerning the handling of strains, etc., than has hitherto been considered practical or necessary by telephone men. It is a deplorable fact that a lack of knowledge of the forces and combinations of strains, resistance of soils and strength of materials in construction work has caused greater loss to investors, and greater damage to service, than any other element with which this committee has to deal. Hence, it has been deemed advisable to depart from the regular paths heretofore followed and to reduce to tabulated form in such manner as to be readily understood by the average lineman, or non-technical man, various mechanical propositions, the understanding of which is vital in the execution of construction work, and to remove the handling of strains, placing of guy wires, etc., from the realm of guesswork, and cut-and-try methods, to definite rules, reduced to tabulated form for ready reference.

It is remarkable, when we consider the simplicity of the problems involved, that this most important element should have been so much ignored by telephone engineers, and left for development almost entirely in the hands of the lineman and foreman, whose knowledge as to the holding qualities of his work has been drawn entirely from a comparison of his present methods with those of the past or with the methods of others which have or have not held up under the actual test of time. Some of these men have gained an excellent knowledge of the forces with which they have to deal. This knowledge has been acquired in the school of experience, at an enormous cost to the industry, and is as zealously guarded by its possessors as were the details of the practical art of telephony in the palmy days of the great monopoly. Yet, with all their experience their methods are expensive, for they only have one test: "Does it hold?" and this, too, is purely a matter of judgment. Not knowing the exact values of the forces, they have no means of knowing how much they over-do their work. In fact, their motto generally is: "You can't make it too strong." Hence, there is no intelligent consideration of proportions. The rule of cut and try is still the rule applied to far the major portion of long distance construction work of telephone companies throughout the country. To replace this rule with something like a simple and comprehensive method of determining values of forces to be provided for, and of making adequate and economical provision for them has been the object of this committee. The following constitutes some of the efforts in this direction.

It is impossible at this time to go into all the details of construction work to which the committee has devoted its attention. Hence, only a few of the most important features will be dwelt upon. I think it advisable, for the sake of clearness, to put the cart before the horse in this discussion, and begin with the stringing of wires and finish with provisions for handling the resulting strains by means of guys and anchors.

In the placing of circuits upon a pole line, it is vital that the wires be pulled to the proper tension, so that in the coldest weather likely to be experienced in that locality the contraction of the wire caused by lowering temperature will not cause the tension to approach dangerously near to the breaking strain, and so that at the highest probable temperature, the expansion will not be such to so loosen the wires as to make it possible for them to swing together under ordinary conditions. Telephone engineers have long since worked out and published the proper deflection in inches of various wire gages for given spans calculated to give the best results. Fig. 1 shows this data as tabulated in standard works. The committee has added to this table the strains resulting from these deflections for the various gages of copper and iron wire in general use. This provides a table for ready reference by the line foreman, who is thereby enabled to use a dynamometer for determining strains, and at the same time to check results with an ordinary steel square or *vice versa*. It also furnishes data from which to compute the maximum and minimum strains under any condition of weather or temperature for either temporary or permanent work. Let us note at this point that in making provision for guying any corner, or end, the strain to be provided against is the total of the breaking strains of all the wires depending on this point for support. This is designated as the maximum applied strain.

In Fig. 2 we have a diagram showing a corner, the center pole, *B*, being 5 ft. out of line with poles *A* and *C*, the distance, 5 ft., being designated as "pull." This diagram is taken from Kempster B. Miller's "American Telephone Practice." Mr. Miller gives us a table for the proper length of spans for a given pull on curves or corners, and, taking these span lengths as standard, this committee has worked out Table 3, which gives the actual pull or strain to be provided for each gage of wire in common use at the maximum applied strain. Hence, if we have a pull of 5 ft., the span should not exceed

Fig. 1

Temp. in Degrees	Length of Span in feet.					Tension in Pounds on 130' span.							
						Copper			Iron				
	75	100	130	150	200	6	8	10	6	8	10	12	14
						1232	778	489	1719	963	750	493	318
-30	1	2	3.5	4.5	8	592.5	375	240	8286	463	3625	2375	1530
						533	337.8	215	7369	3916	3417	2099	
-10	1.5	2.5	4	5	9								
						474.5	281.2	180	6651	3262	2925	1785	
+10	1.5	3	4.5	6	10.5								
+30	2	3	5.5	7	12	400	249.8	1596	5262	280	2269	1518	
+60	2.5	4.5	7	9	15.5	286	187.1	120	4087	2175	1762	1162	
+80	3	5.5	8.5	11.5	19	232	146.8	99	3201	1705	138	91	
+100	4.5	7	11	14	22.5	1805	1208	77	2628	1398	113.3	747	

Contraction of Copper is .0000098 of its length for each degree Fahrenheit
" " Iron " .0000069 " " " " " " "
" " Copper on span of 130' for each degree .00127 Fahrenheit
" " Iron " " " " " " " .00096 "
Total Contraction Temp. drop 100 to 30 Copper Span 130' = .1872 "
" " " " " " Iron " 130' = .1298 "

Formula for determining tension

$$\text{Tension} = \frac{(\text{Span}^2) \text{ Weight per ft.}}{(\text{Deflection in inches})^2}$$

Fig. 2.

Fig. 3.

	Copper			Iron					
Pull	#6	#8	#10	#6	#9	#10	#12	#14	Span
5ft.	51.4	32.5	20.3	71.6	38.1	31.	18.7	12	120
10"	11.22	20.7	9.44	15.62	18.31	6.81	9.31	2.61	110
15"	18.52	11.67	7.33	25.78	13.72	11.25	7.1.2	4.32	100
20"	27.44	17.28	10.86	38.2	20.55	16.66	10.55	6.4	90
25"	41.16	25.93	16.3	53.3	30.5	25.0	15.8.	9.6	75
Breaking Strength	1235	778	489	1719	925	750	495	288	

Tables and Diagram Useful for Foreman in the Field in Constructing Pole Lines.

120 ft., at which length the maximum applied strain to be provided for in guying at *B* would be, for No. 6 B. & S. copper, 51.4 lbs.; for No. 8 B. & S. copper, 32.5 lbs.; for No. 6 B. & S. iron, 71.6 lbs., etc. The guy should be planned in view of the total number of circuits of the various gages of copper or iron or both, which the lead is ultimately proposed to carry.

This brings us to the matter of guying. What strain is brought to bear on the guy wire, either head or heel guy, at the pole *B*? Fig. 4 has been devised to show the simple distribution of strains at this point. *A, B, C*, represent the triangle formed by the pole, represented as perpendicular *BC*, the guy wire as hypothenuse, *AB*, and the distance from pole butt to

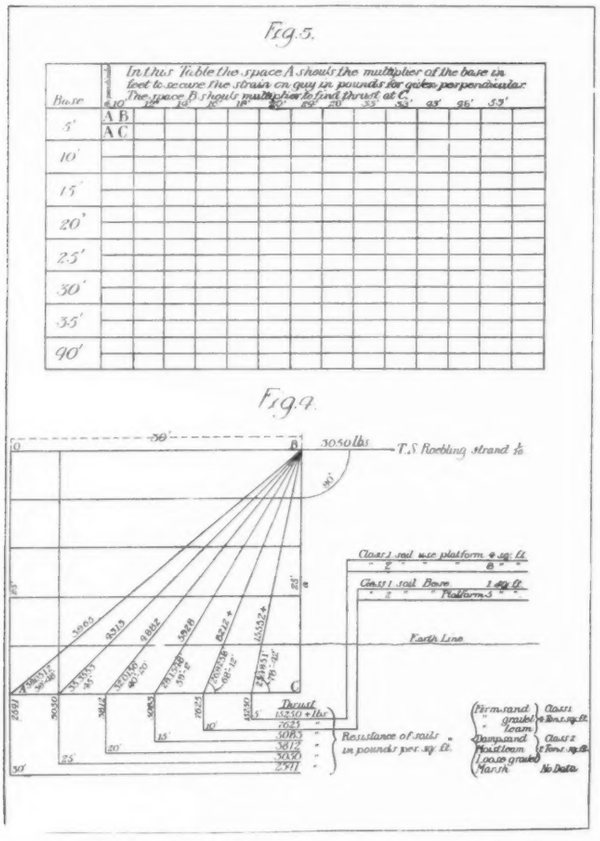


Fig. 5.
In this Table the space A shows the multiplier of the base in feet to secure the strain on guy in pounds for poles perpendicular. The space B should multiply base to find thrust at C.
Base
5'
10'
15'
20'
25'
30'
35'
90'
Fig. 4.
30'
B
3050 lbs
T.S Roebling strand ½
Class 1 soil use platform 6 sq. ft.
Class 1 soil Base 1 sq. ft. Platform 3
Earth Line
Thrust 13210 + lbs
Resistance of soils in pounds per sq. ft.
Firm sand or gravel & Loam Class 1 6 Tons sq. ft.
Dampsand Moist loam Loose gravel Marsh Class 2 4 Tons sq. ft.
No Data.

Diagram of Guy Wire Strains and Table for Determining the Size and Number of Strands for the Various Strains.

anchor as the base, *AC*. Let us take the angle *C*, as 90 deg., for the sake of convenience. This can safely be done, as the raking back of the pole reduces the strain on *AB*, increasing slightly the factor of safety. Then let us assume that the point of application of the guy strand is 25 ft. above the butt of the pole, and the point at which the guy wire intersects the base line is 30 ft. from the pole. This is typical of the ordinary conditions confronting the construction man. The problem must in nine cases out of ten be worked out on the ground by the line foreman, who often knows nothing of trigonometry, geometry, or even of simple ratio and proportion. The problem confronting *us* is to work it out for him, and place it in simple tabulated form for ready reference, so that he may always have at hand a definite and simple method of determining, not only the direction and values of the various forces to be met, but the actual resistance and strength of the materials at hand with which to meet them. For instance, let us assume that we are building a corner, at which we expect to terminate circuits, the maximum applied strain of which will ultimately be 3050 lbs. The engineer readily computes the resultant strains as follows: Complete the parallelogram *ACBO*. Then lines *OB=AC* and *OA=CB*. Then the forces resultant in the various directions by the application of a force at *B* are proportional to the lines of the parallelogram thus formed. Hence, let *OB* represent 3050 lbs., find the force *AB*. To do this, the exact length of *AB* must be determined. But plane geometry teaches us that the length of *AB* is the square root of AC^2+CB^2, or

$$\sqrt{30^2+25^2}=39.0512.$$

Therefore, by the parallelogram of forces,

$$39.0512 : 30=X : 3050$$
$$X=3965 \text{ lbs.}$$

To find the downward thrust on the pole at *C*, we have only to determine the simple relations between the lines *OB* and *BC*. Hence,

$$30 : 25=3050 : X=2541 \text{ lbs.}$$

This process has been reduced to tabulated form, as in Fig. 5, so that for any ordinary given distance between the butt of the pole and point of application of the guy, combined with any ordinary distance between pole and anchor, a multiplier is given, in the blank space *A*, which will give the resultant force applied on the guy *AB*, of Fig. 4, for one pound applied at *B*, and in the space *C*, the resultant thrust at *C* for each pound applied at *B*. By the use of this table, in connection with the foregoing tables of breaking strains, the proper size of strand and the number to be used for any ordinary combination of strains may be determined.

It will be noticed in the explanatory diagram that the increase of tension on the guy wire is rapidly accelerated as the base line shortens. It is not infrequently the case that we find a ratio of 1 to 5, as shown in the smaller of the six triangles. Let us consider for a moment what this condition means. Supposing we have one circuit of No. 9 B. & S. iron, two circuits No. 10 B. & S. copper and two circuits of No. 12 B. & S. iron. The maximum applied strain would be

2 iron, No. 9.....3014 lbs.
4 iron, No. 12.....1629 lbs.
4 copper, No. 10.....1050 lbs.
or a total of 5.684 lbs., applied at C.

The tension on *AB* would, in this case, be $5684 : X=5 : 25.4951$ = or 28982 lbs., while the downward thrust on the pole would be $5684 : X=5 : 25$ or 28,420 lbs. At a distance of ten feet, or a ratio of 2 to 5, the strains would still be enormous, and far beyond the usual provisions in guying, for on the guy it would be 14,491 lbs., and the downward thrust on the pole would be 14,210 lbs., or a little over seven tons in each case. Now the breaking strain of Roebling ½-in. strand is 8,320 lbs. Hence, it would take two such strands and a 1-in. anchor rod to hold the strain that would be applied to the latter case during a sleet storm, when the load on the suspended wires had become sufficiently heavy to cause breakage to begin.

However, it is not always the guy which gives way under severe strains. Let us consider for a moment the thrust or downward pressure on the pole itself. In the case just cited, there is a pressure brought to bear on the foundation of the pole of 14,210 lbs. or about 7 tons. Now the resistance of soils, as shown in the explanatory diagram, ranges from two to four tons per sq. ft. Hence with a thrust of 28,982 lbs., as is the case with the 5-ft. base, there is nothing more certain than that the pole will be *forced into the earth* and go over. To prevent this a foundation of at least 4 sq. ft. in Class 1 soil and 8 sq. ft. in Class 2 soil is necessary. The writer has seen anchors set to handle just such cases as this, where the anchor was buried 12 ft. in the earth, and bedded in concrete while the pole, set in soft soil, was left entirely without foundation. Such construction as this is like closing and double locking the doors to keep out the thief and then lying down in fancied security with all the windows open.

It will readily be seen from the foregoing what enormous strains must be provided for on leads carrying 20 or 30 circuits. The heavy loss from year to year caused by sleet and storms, often causing the wrecking of hundreds of miles of telephone lines could be materially reduced by proper working out of these problems by the men who build the lines. That they have not been worked out can be easily proved even on some of the best construction work. The proportion of guys built with mathematical accuracy is so small that inquiry and observation of two years has failed to uncover more than one

or two cases. The fact is that telephone engineers have practically ignored this most important element of telephone construction, each evidently thinking his company's interests to be sufficiently safeguarded by turning these details over to a first-class construction foreman with his rule of thumb and cut-and-try methods.

The matter of guying is not the only element neglected. We are still using means of terminating circuits which are inadequate and antiquated. The double arm unsupported by truss and buckled into a crescent, or twisted by the excessive strain applied far above the center is still to be seen. It is almost unaccountable that telephone engineers have failed to provide a rigid, serviceable terminal arm. On two-thirds of the construction work the strength of these arms is insufficient to carry permanently even the normal strain on the line. Hence loosened circuits are the rule, causing heavy outlay of money every year clearing trouble.

In many other directions the committee has found ample opportunity for profitable labor where the collection and tabulation of data would be surprising, not because of anything new that may be discovered, but, as in the case of the puzzle picture, we have looked at it so long and never saw but the one figure, when our attention is called to a second and its outline is traced, it comes to us with something of a shock.

In closing, I wish to remark that construction work deserves and requires as careful study as any other phase of the business, and when we are able to give it the same degree of care that the civil engineer gives to the design of a bridge or tower and reduce the whole to an exact science, only then will the men in charge of the affairs of telephony be able to render a proper accounting to investors for the funds intrusted to them.

It has been the purpose of this committee to seek and remedy weaknesses and to arouse in others sympathy, support and co-operation in this direction.

Thus far, only a very small portion of the field has been touched, but it is to be hoped that as this discussion broadens, interest will be developed and a competent corps of men will turn their efforts in this direction.

Local Traffic*

By A. J. Shands

The subject of local traffic is quite large, and to deal with it properly one would have to start from the very beginning and go through it step by step. Just where the beginning would be is a matter of opinion. Some would say the beginning is with the switchboard specifications, and that is not too early to begin, but as that seems to be more engineering than operation, we will begin with the new applicant.

The selection from applicants of persons to become student operators is not as easy a problem as might be expected. In selecting from the many applicants a few to become operators, a great deal must be considered. A thing that should not be lost sight of for an instant is that the selection is one that is going to affect the company in the future. Will the applicant be an operator up to the required standard? Do her general actions indicate that she will be quick and active enough to handle the number of calls expected of all operators in time? Does her tone of voice, her accent, impress you in a way that makes you think that she is a person that is fitted for the place of representing the company in handling its greatest asset, the best advertisement that a telephone company has, and do this in a way so that the public (the ones that are to be pleased) will say your service is good service.

It is a grave mistake to admit an applicant just because she is recommended by some one who is connected with the company, or for a similar reason, if she does not come up to the necessary requirement. These cases not only cost the company money by trying them or giving them a chance, but take up a great deal of time that is also a dead loss. Operators from this class will almost invariably do more to break down good service than they will to maintain or improve it.

All these things having been considered, together with her height, sight, etc., and the applicant having been employed, then comes the first instructions. The student is taught the meaning of the words jacks, cords, keys, etc., is taught to select numbers in the multiple, and the various symbols and markings, and it is not so very long before she recognizes these in a mechanical sort of way. But this is not true with the words or phrases she is taught to use. It is not hard for her to learn the wording of the phrases to be used when the different conditions arise, but to use these phrases with the proper accent and in the proper tone of voice seems to be more difficult. At this point the student should be so thoroughly drilled that she will not only use the phrase correctly worded, but with an accent that carries courtesy in every word. Operators generally do not seem to realize that they control the temperament of the telephone users to a great extent. At least they do not always take advantage of this, as is shown by curt or expressionless replies that are made. A little courtesy costs nothing, and goes a long way toward making our work more pleasant.

After the student has been taught the different markings, phrases, etc., and knows how to operate from the practice she has had, she is passed to the board and her work should be supervised by a supervisor or an older operator. But care should be taken in selecting the operator in whose care she is to be placed. Many employees are very good operators, but very poor when it comes to telling others how to operate. A promising student can be very easily discouraged if she is placed with some one who has not the necessary patience and the knack of correcting or coaching them in a way that will show them their mistakes, but will not offend them or injure their feelings. Student operators are frequently very sensitive until they have acquired confidence. An experienced operator who does not take kindly to coaching students is quite likely to pass a student along as competent too soon, just to relieve herself of work that is irksome to her, and cases of this kind affect the service more than is generally realized. Start the student right and it is not much trouble to keep her right, but let her get away from the instructions or from her own ideas concretely early in her career as an operator, and there is but one of two alternatives—start her all over again, or worry along until she finally ceases to be an operator for one reason or another.

Having coached the student to the point of self-confidence, through the medium of the instructor and the senior operator or supervisor, the next step of placing her in a position to depend upon herself, or nearly so, is equally as delicate as moving her from the instructor's board to the board proper. In most exchanges, especially

*Paper presented at the Convention of the International Independent Telephone Association, December 1, 1908.

the larger ones, the load is distributed as equally as possible in all positions; therefore it is necessary that the student take up a position the same as would a more experienced operator, and in placing her the supervisor should be careful to know the disposition of the operators on either side. Should the student be placed between two who will not help her by answering some of her calls, and showing her how to help herself, she is liable to feel the task too great; but if the conditions be the opposite she will begin to acquire more confidence and speed from the start. Too much thought cannot be given to the first instructions to operators and the subsequent development up to the time they are expected to be competent, or capable of caring for the work according to their length of service. A good start is a thing half done.

From this time on the operators are in charge of the chief operators or supervisors and are expected to improve, not alone in accuracy and speed as their length of service increases, but in following instructions that were given before, and the importance of which the student operators do not appreciate. Good service does not only mean quick attention from the operators and connections between the different stations, but means all of this together with the avoidance of unnecessary interruptions. Interruptions are caused by the operators, and their occurrence can be minimized by carefulness on the part of the operators. It is the interruptions caused by cord, key, line or other troubles which are annoying to subscribers, and which operators frequently notice but do not fully realize what these troubles, even those that appear the most trivial, mean to themselves in their work and to the service. A case of trouble noticed by an operator should be reported by her and reported again every time she notices it, if it is not repaired within a reasonable time after her first report. In large exchanges about one per cent of the calls cannot be completed, and basing the foregoing statement on this item alone, it will be generally admitted by managers of large exchanges that their "Can't Raise" reports do not equal one per cent of the originating calls. The necessity of team work should be thoroughly explained to the operators. In order to have a uniform answering time, the operators must help each other as much as possible, and the reason for this should be made clear. It is not good practice to tell an operator that she must help the operators on either side of her in just those words, but make it clear that the object is uniformity of answering service, and to gain this one should help the other as much as possible, and by doing this they are helping themselves.

Office discipline and the conduct of the operators, both in the operating room and recreation room, are subjects of importance, and are usually governed by the local conditions with the exception of operators' privileges at the board, and this is a point that modern apparatus has taken care of in itself to a large extent, particularly in the larger exchanges. Operators cannot be permitted to talk to each other while on duty, unless the work demands it, and that is seldom. The work in larger exchanges is usually so arranged that there is very little time for personal conversation.

Chief operators and supervisors are placed in charge of the operators, and their duties in part are to see that the operators handle the subscribers' calls according to the instructions given them, to maintain efficient discipline, etc., but their work does not stop there. They are held responsible for the service given by the operator and to do this it is necessary that their knowledge of handling traffic must be used. A supervisor cannot give good service if the work of her operators is not good, neither can she give good service if the positions in her division are overloaded during the busiest hours or at frequent intervals during the day. These conditions are not always shown on peg count day and it is to the supervisor or chief operator that the manager looks for information of these irregular conditions.

In selecting chief operators and supervisors many things must be considered. A good operator does not always make a good supervisor. It is well, as far as possible, to advance the operators according to their length of service, but this can only be one of the things to consider and by no means should it be allowed to offset any of the other qualities that are so important and which some younger operators may have.

The supervisor should be a good operator—not necessarily one of the quickest—careful in her work, one who has judgment in dealing with the irregular conditions as they arise, and a person who can handle other operators in a way that will cause them to do their best work when she is not watching them, as well as when she is. A supervisor who has not the ability, either natural or cultivated, to coach, correct or reprimand her operators in a way that is not humilitating to or is inwardly resented by them has a difficult time in giving a good service.

In branch exchange systems where "B" or trunk operators are necessary, the selection of these operators is made from the local board operators, but the requirements are not the same. To select the best "A" operator for "B" work seems the logical thing to do, but this does not always work out as expected. On the "A" board an operator may do good work, but there she controls the number of persons who can talk to her at one time, but on the "B" position it is quite different. And although one is a good "A" operator, she may not be much of a success on the "B" board, simply because she is easily excited or confused. The "B" operator must necessarily be quick to think and quick to act. There are times when the loss of self-control on her part would materially affect the service of some branch office for several minutes. The "B" operator should feel that she is a part of the office whose wire she is handling, and if in full sympathy with them, she will be able to do much to help that office give a good service to the subscribers of that district.

(To be continued.)

Meeting of Kentucky Independents.

The annual state meeting of the Kentucky Independent Telephone Association was held at the offices of the Louisville Home Telephone Company, Louisville, Kentucky, November 30. Nearly all the companies in the state were represented and the afternoon session was held in the large directors' room of the Home company.

Many interesting papers were read and a general outline of business was discussed, and plans made to strengthen the state organization. Many new companies have joined the Association during the past year and the treasurer has a good balance to start in 1909 after having paid all the expenses for the year. The following officers were elected for the ensuing year:

Frank G. Hoge, Hopkinsville, Ky., president; W. J. Thomas, Shelbyville, Ky., first vice-president; W. S. Taylor, Lexington, Ky., second vice-president; J. J. Lynch, Nicholasville, Ky., third vice-president; H. C. Jones, Owensboro, Ky., fourth vice-president; secretary, W. G. Turpin, Henderson; treasurer, J. W. Chambers, Winchester, Ky.

Executive Committee: George S. Shanklin, Lexington, Ky.; D. L. Pendleton, Winchester, Ky., R. F. Hickman, Henderson, Ky.; H. R. Sykes, Bowling Green, Ky.; P. S. Pogue, Louisville, Ky. Mr. George S. Shanklin, Lexington, Kentucky, was elected delegate at large to represent the state at the National Association.

The Telephone in the Courts

Conducted by A. H. McMillan

Trimming Trees and House Moving in Iowa and Minnesota.

Can you inform us as to the laws of Iowa and Minnesota respecting tree trimming and house moving?

In Iowa a company which has a right to use the highway in front of abutting property may trim trees reasonably without being called upon to pay damages. Myer vs. Standard Telephone Company (Ia.) 98 N. W., 300. Substantially the same rule would exist in Minnesota.

On the subject of house moving, no decisions from the courts of either state have come to our attention. But the rule would undoubtedly be in this state just as it is in general, viz.: that if there is not any way for the building to be moved other than across the street occupied by the telephone line, and the parties desiring to move it have permission from the proper authorities to use the street for that purpose, the telephone company is obliged to move its wires and cables to let the building pass. If, however, the party moving the building can use a side street or alley just as well, he can be required to use it. A bond to pay all expenses and hold the company harmless from injury may be required of the person moving the building. If the house mover is unwilling to indemnify the company against the possible damages to which it may be subjected, its remedy is the suing out of an injunction to restrain the house mover from interfering with its wires. A license from the city giving the house mover permission to move a building through the streets is no protection against such an injunction at a suit of the telephone company.

McMillan on Telephone Law, Sec. 240; Northwestern Telephone Exchange Company vs. Anderson (N. D.) 98 N. W. 706.

More Litigation About Minnesota Gross Earnings Tax.

The State of Minnesota has appealed from the decisions of the district courts of the state in suits to collect gross earnings tax from the Northwestern Telephone Company and the International Railway Company. It was asserted by the state in its suit against the telephone company that items which should have been included in the gross earnings returns had been omitted. The particular items in dispute with the telephone company were: Income other than from operation such as dividends on stock owned by the company, and profits from the sale of securities; rebates or charges to earnings before reported for taxation; messenger earnings, free telephones and receipts from the sale of material. The amount involved with the telephone company is $5,855.95. The district court gave judgment against the telephone company for part of the items enumerated, amounting to $1,481.16. This will result in further interpretation of the term "gross earnings" as applied to these corporations. The gross earnings tax law was recently before the Supreme Court of the state in the case of State vs. Tri-State Telephone and Telegraph Company 116 N. W., 835, the court there holding that the gross earnings tax was in lieu of all other taxes except special assessment.

Company Should Anticipate Increased Cost of Service.

At Hazelhurst, Miss., the chancellor has decided the case of the Cumberland Telephone & Telegraph Company against the town. The case was heard upon a motion to dissolve the injunction previously granted against the municipality. After a long argument the chancellor announced that he thought it was the duty of the company to stand by its rates, and that the increased cost of service which came during the life of the contract should have been anticipated by the company. He also decided that the company had violated its contract in not furnishing free county service, and dissolved the injunction in so far as it prevented the prosecution of the company for such violation. At the same time he held that the ordinance could not be upheld in so far as it directed the destruction of the long distance poles and wires, and added that inasmuch as the company would have the right to re-enter the town under the code of 1905, it would look like a wanton and useless destruction of property to destroy the local system, which the company would have the right to immediately rebuild, and he therefore made the injunction perpetual in so far as it prohibited the officers of the town from destroying the local and long distance exchange in the town. Each of the contending parties was required to pay one-half of the costs of the case.

Liability for Loss of Business Resulting from Interrupted Service.

In the issue of September 5, 1908, a report was made of a decision by Justice Stocker in the case of Marietta E. Hughes against the Pacific Telephone & Telegraph Company. This case was incorrectly stated as having occurred at Cleveland, O. It really happened at Spokane, Wash. Justice Stocker rendered judgment against the company for damages for costs and interruption of service, because he felt that it was shown conclusively that the negligence of the company's employees was the cause of the interruption. The case was appealed to the higher court, and regularly set for trial, witnesses for the plaintiff being subpoenaed, and on the date it came up for trial the defendant paid the judgment, costs and cost of appeal.

Accident Requires Explanation from Company.

The Supreme Court of New York has decided that when an electric company is sued for damages resulting from an accident, the circumstances of which indicate that the company has been negligent, the latter is called upon to offer some explanation of the cause of it consistent with the exercise of due care on its part. In other words, it is incumbent on the company when sued either to dispute the facts from which the legal presumption of negligence arose or else to offer evidence tending to rebut such presumption. This is upon the doctrine "res ipsa loquitur." This phrase means "the thing itself speaks." The case is subject to appeal.

Moglia vs. Nassau Elec. R. Co., 111 N. Y. S., 70.

Kind of Equipment to be Used on Rural Lines Results in Law Suit.

At Onstead, Wis., a member of the North Star Telephone line, organized by a number of Woodstock farmers, would not install the same kind of telephone in his house as was used by the other members of the company. Therefore the other members tried to oust him, and made it unpleasant for him by cutting off his connections and taking down the wires which connected his telephone with the line and throwing them into his barley field. He brought suit against the company before a justice of the peace, and was given judgment for $25 and costs, together with the use of the telephone line.

Those Present at the Convention*

F. T. Rinder, Electric Storage Battery Company; Jos. Rose, vice-president American Wood Preserving Company, Chicago, Ill.; M. A. Reed, secretary Woodbine Telephone Company, Woodbine, Ia.; G. W. Rodormer, salesman American Electric Fuse Company, Muskegon, Mich.

F. R. Strickler, secretary Franklin Telephone Company, Franklin, Ind.; Geo. B. Spitler, Moultrie County Telephone Company, Mt. Zion, Ill.; Geo. S. Shanklin, president Fayette Home Telephone Company, Lexington, Ky.; R. C. Sayers, with Jefferson County Telephone Company, Fairfield, Ia.; A. J. Shands, superintendent exchanges Kinloch Telephone Company, St. Louis, Mo.; B. H. Sanders, with German American Company, Houghton, Ia.; F. S. Shoemaker, manager Bloomington Home Telephone Company, Bloomington, Ind.; J. G. Sanders, manager German American Telephone Company, Houghton, Ia.; H. W. Shaw, manager Daviess County Home Telephone Company, Washington, Ind.; C. W. Swaverly, manager Swaverly Telephone Company, Kalkaska, Mich.; W. F. Sherfesee, chief Office of Wood Preservation Forest Service, Washington, D. C.; H. Suelflow, secretary Friestadt & Cedarburg, Mequon, Wis.; Omar L. Spangler, manager Bryan Telephone Company, Bryan, Ohio; Mrs. Olive L. Spencer, secretary Whittier Home Telephone Company, Whittier, Cal.; Fred Schnauber, president Yankton Telephone Company, Yankton, S. D.; J. Stone, of Stone & Green, Chicago, Ill.; Chas. F. Speed, secretary and treasurer Home Telephone Company, Monroe, La.; G. L. Saunders, manager Interior Telephone Company, Grinnell, Ia.; E. B. Smart, manager Wood County Telephone Company, Grand Rapids, Mich.; Albert Schuler, manager Automatic Home Telephone Company, Pontiac, Ill.; Chas. M. Showalter, Parkersburg, W. Va., Fred H. Suter, with Audit Company of New York, Chicago, Ill.; H. Lee Sellers, president Telepost Company, New York, N. Y.; Dr Chas. Segerlund, general manager Boone County Co-operative Telephone Company, Caledonia, Ill.; E. Sipperley, Milwaukee, Wis.; C. J. Sinsel, general manager Independent Long Listance Telephone Company, Boise, Idaho; Mrs. Frank Stone, Monarch Electric Company, Marion, Del.; Company, Elmore, Ohio; Manford Savage, president Home Tele-J. E. Steinkamp, manager The New Ottawa County Telephone phone Company, Champaign, Ill.; W. J. Stadelman, general manager Norfolk Long Distance Telephone Company, Norfolk, Neb.; J. H. Shoemaker, president Iowa Independent Telephone Association, Waterloo, Ia.; E. D. Schade, secretary and general manager Johnstown Telephone Company, Johnstown, Pa.; O. C. Snider, general manager Home Telephone Company, Kansas City, Mo.; Claude R. Stoops, president and general manager Nappanee Telephone Company, Napanee, Ind.; E. Start, United Press, Chicago, Ill.; Carl W. Sharer, superintendent of equipment Keystone Telephone Company, Philadelphia, Pa.; F. G. Short, president Jefferson County Telephone Company, Ft. Atkinson, Wis.; C. W. Shimel, proprietor Shimel Telephone Company, Casey, Ill.; A. L. Staderman, engineer Citizens Independent Telephone Company, Terre Haute, Ind.; A. F. Stodder, with National Telephone Company, Levis, Que., Can.; C. F. Stevens, president Oakland City Telephone Company, Oakland City, Ind.; Ira T. Schwartz, with Independent Telephone Securities, Indianapolis, Ind.; Charles S. Sernine, president Home Telephone Company of Puget Sound, Tacoma, Wash.; H. C. Stifel, St. Louis, Mo.; J. W. Shernick, president Pine County Telephone Company, Willow River, Ohio; J. M. Storkerson, superintendent La Crosse Telephone Company, La Crosse, Wis.; Carl Seyler, manager Hubbard & Company, Pittsburg, Pa.; Wm. C. Schramm, salesman American Carbon & Battery Company, East St. Louis, Ill.; Alfred Stromberg, Chicago, Ill.; J. M. Van Splunter, commercial engineer General Elec. Company, Chicago, Ill.; M. L. Scobey, with Electric Appliance Company, Lincoln, Neb.; E. A. Shader, with Stromberg-Carlson Telephone Manufacturing Company, Chicago, Ill.; W. H. Scott, with Dean Electric Company, Elyria, Ohio; John R. Searles, with Detroit Copper & Brass Rolling Mills, Detroit, Mich.; Carl W. Schafer, sales manager Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y.; E. P. Shafer, salesman Stromberg-Carlson Telephone Manufacturing Company, Indianapolis, Ind.; Fred Seeley, with Swedish American Telephone Company, Elwood, Ind.; A. B. Smith, salesman Dean Electric Company, Grand Rapids, Mich.; H. C. Slemin, advertising manager Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y.; C. A. Soans, engineer Homer Roberts Telephone Company, Chicago, Ill.; H. D. Schaler, secretary Doubleday Hill Electric Company, Pittsburg, Pa.; G. G. Sylvester, assistant superintendent Scranton Button Company, Scranton, Pa.; A. L. Seaman, with J. A. Roebling's Sons Co., Chicago, Ill.; L. Sands, with Century Telephone & Construction Company, Cleveland, Ohio; G. E. Spalding, with Burroughs Adding Machine Company, Chicago, Ill.; W. H. Slingluff, salesman John A. Roebling's Sons Company, Chicago, Ill.; H. Stephens, with Dean Electric Company, Des Moines, Ia.; W. W. Smyth, Jr., western manager Fiber Conduit Company, Chicago, Ill.; W. M. Smith, treasurer Chicago Insulated Wire & Manufacturing Company, Chicago, Ill.; A. O. Stigberg, branch superintendent Stromberg-Carlson Telephone Manufacturing Company, Chicago, Ill.; Charlotte Schulz, with International Telephone Company, Chicago, Ill.; E. J. Pietzker, manager Standard Underground Cable Company, St. Louis, Mo.; Henry Shafer, with the International Telephone Company, Chicago, Ill.

*Concluded from issue of December 5, 1908.

Theo. Thorward, president Home Telephone Company, South Bend, Ind.; Mrs. G. P. Thorpe, Clinton Telephone Company, Wilmington, Ohio; W. G. Thompson, manager Home Telephone Company, Hamilton, Ohio; Chas. Taylor, Bainbridge Telephone Company, Bainbridge, Ohio; Geo. T. Thorward, assistant manager Home Telephone Company, South Bend, Ind.; W. B. Thompkins, manager Home Telephone Company, Quincy, Ill.; M. S. Taylor, general manager Fayette Home Telephone Company, Lexington, Ky.; W. J. Thill, secretary Iowa Independent Telephone Association, Des Moines, Ia.; H. B. Taylor, treasurer U. S. Telephone Company and Cuyahoga Telephone Company, Cleveland, Ohio; J. B. Terry, general manager J. B. Terry Company, Cedar Rapids, Ia.; G. P. Thorpe, secretary Clinton Telephone Company, Wilmington, Ohio; C. E. Tarte, general manager Citizens Telephone Company, Grand Rapids, Mich.; W. O. Taylor, Lagro-Andrews Telephone Company ,Andrews, Ind.; J. C. Thorne, president Jefferson County Telephone Company, Fairfield, Ia.; J. F. Tompkins, sales manager Frank B. Cook, Chicago, Ill.; R. L. Thayer, St. Louis Malleable-Castings Company, St. Louis, Mo.; J. D. Templeman, salesman Sterling Electric Company, Cleveland, Ohio.

Walter J. Uhl, secretary-manager Home Telephone Company, Logansport, Ind.; Martin Umbach, traffic manager Home Telephone & Telegraph Company, Ft. Wayne, Ind.

Will Van Middlesworth, Citizens Telephone Company, Racine, Wis.; J. H. Van Wagener, engineer with W. C. Polk, Chicago, Ill.; A. T. Vaniman, manager Girard Telephone Company, Girard, Ill.; W. S. Vivian, secretary Michigan Independent Telephone Association, Grand Rapids, Mich.; A. J. Vernier, Eastern Illinois Telephone Company, Kankakee, Ill.; J. T. Van Woolwich, president Fox River Valley Telephone & Telegraph Company, Appleton, Wis.

F. C. Woods, general manager Galesburg Union Telephone Company, Galesburg, Ill.; G. A. Welbourne, president Carl Junction Telephone Company, Carl Junction, Mo.; C. H. Winebar, manager Bucyrus Telephone Company, Bucyrus, Ohio; A. Wardman, general manager Home Telephone & Telegraph Company, Whittier, Cal.; M. N. Williamson, assistant editor Southern Electrician, Atlanta, Ga.; H. G. West, Eastern Illinois Independent Telephone Company, Kankakee, Ill.; W. A. Wadsworth, advertising manager Popular Electricity, Chicago, Ill.; J. B. Ware, secretary International Independent Telephone Association, Grand Rapids, Mich.; S. E. Ward, Mansfield Telephone Company, Mansfield, Ohio; G. F. Wombacher, secretary-manager Lookingglass Prairie Telephone Company, Mascoutah, Ill.; A. A. Whitney, president Morrow County Telephone Company, Mt. Gilead, Ohio; C. E. Wilson, general manager Keystone Telephone Company, Philadelphia, Pa.; R. A. Walker, manager Mutual Telephone Company, Des Moines, Ia.; F. H. Woods, president Lincoln Telephone Company and Western Telephone Company, Lincoln, Neb.; Chas. West, general manager Consolidated Telephone Companies of Pennsylvania, Allentown, Pa.; F. Page Wilson, secretary-treasurer Canadian Independent Telephone Association, Toronto, Ont., Can.; H. A. White, president-manager Coffey County Telephone Company and Baldwin Telephone Company, Waverly, Kan.; L. C. Wright, Home Telephone Company, Jamestown, N. Y.; J. H. Wright, general manager Home Telephone Company, Jamestown, N. Y.; W. P. Walker, traffic manager Corn Belt Telephone Company, Waterloo, Ia.; W. N. Wolcott, Delaware County Telephone Company, Manchester, Ia.; C. L. Waite, manager Peoples Telephone Company, Chillicothe, Mo.; S. M. Wolf, secretary Galion Telephone Company, Bellevue, Ohio; E. C. Wolfers, secretary Hopkins Telephone Company, Hopkins, Ky.; F. L. Wilson, Washington Telephone Company, Washington, Ia.; Roy Wertz, manager Johnson County Telephone Company, Iowa City, Ia.; R. T. Wolfman, secretary Local Telephone Co., Bellevue, Ohio; L. R. Witteman, Mansfield Telephone Company, Mansfield, Ohio; E. N. Wheelwright, manager Roanoke Telephone Company, Roanoke, Ill.; L. J. Wylie, superintendent construction Home Telephone Company, Decatur, Ill.; F. L. Workman, salesman Workman Manufacturing Company, Chicago, Ill.; Albert E. Wilson, attorney Automatic Electric Company, Chicago, Ill.; J. H. Wagoner, sales manager Cracraft, Leich Electric Company, Genoa, Ill.; M. Whaling, salesman American Steel & Wire Company, Chicago, Ill.; H. H. Woodworth, advertising and assistant sales manager Automatic Electric Company, Chicago, Ill.; W. J. Warfield, Jr., vice-president Interstate Supply Company, Sioux City, Ia.; R. E. Willard, Rock Island Battery Company, St. Louis, Mo.; F. T. Wright, salesman F. W. Pardee, Chicago, Ill.; A. V. Ward, National Carbon Company, 125 La Salle street, Chicago, Ill.; Bond Wisler, salesman American Electrical Works, Chicago, Ill.; G. D. Wilson, salesman with H. E. Cobb, Chicago, Ill.; C. W. Wilkins, salesman National Carbon Company, Cleveland, Ohio; H. W. Weihe, treasurer American Wood Preserving Company, Chicago, Ill.; D. E. Whipple, manager North Electric Company, Kansas City, Mo.; A. D. Watson, Raber & Watson, Chicago, Ill.; J. R. Wiley, manager Standard Underground Cable Company, Chicago, Ill.

Dr. J. E. Yarling, secretary-manager Home Telephone Company, Peru, Ind.; C. D. Young, president Citizens Telephone Company, Delaware, Ohio.

T. Zerwas, manager Manning Telephone Company, Manning, Ia.; J. A. Zeeck, manager Mt. Sterling Telephone Company, Mt. Sterling, Ohio; J. A. Zimmerman, president Valley Falls Telephone Company, Valley Falls, Kan.; Frank Zinnel, Savanna, Ill.

Practical Questions and Answers

Correct Mixture for Wiping Solder.

We have been having some trouble with our cable and have repaired it, during the course of which we had to wipe some joints. In doing so our solder would crumble and would not stick to the joint properly. We supposed that the cause of this is an improper mixture, but could not, by experimenting, find the remedy for it. We would be very grateful to you, if in your query department you would give the formula for wiping solder, or outline some test by which we could know that our mixture is correct.

Could you also give some information as to the properties of tin and lead when mixed to form solder?

The metal generally adopted for wiping solder consists of equal parts of pure tin and pure lead, thoroughly melted together.

Experience has shown that any variation from these proportions, or the introduction of any foreign metal, is injurious to the efficiency of the solder. Variations in the composition from either of these sources usually manifest themselves in the crumbling or decomposition of the solder when the joint is being wiped.

It is a practice among cable splicers to throw odds and ends of cable sheath or junk sleeves into the pot and melt them up with the wiping solder. It may be that your trouble comes from this source through the presence of impurities in the sheath. It may be also that bits of copper wire or other metal are allowed to fall into the pot.

It is easy to find out, by making a joint using nothing but the bar metal and carefully excluding all other metals, whether the trouble is in the solder or not.

We would recommend that you buy nothing for this purpose but a guaranteed half and half solder made by some reliable firm.

Ayrton Shunt for Galvanometers.

I wish you would explain through your columns the Ayrton shunt. I understand that it is a galvanometer shunt which can be used on any galvanometer of any resistance with the same multiplying values. Is that correct?

It is correct if you compare currents and deflections at different settings of the shunt *with the shunt attached*. The

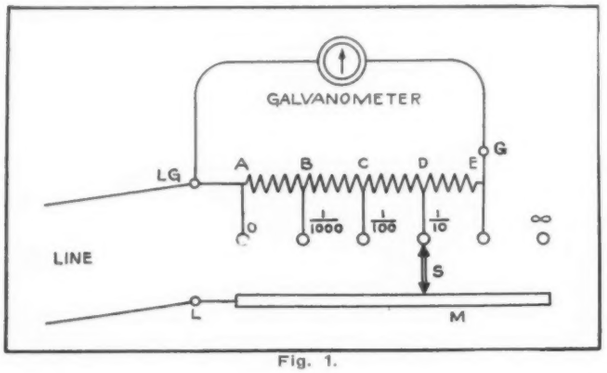


Fig. 1.

deflection with the shunt set at "1" will not compare with a reading taken on the galvanometer without any shunt. Also the deflection obtained with the shunt at the $\frac{1}{10}$ setting will not be one-tenth as much as would be obtained without the shunt. But the readings which you get at all the settings, 1, $\frac{1}{10}$, $\frac{1}{100}$ and $\frac{1}{1000}$ will be in the exact ratio indicated by the fractions.

The principle of the Ayrton shunt is shown by Fig. 1. Six contacts are provided upon which runs a slider, S, the other end of which rests on a contact bar, M. The line carrying the current is attached to the binding posts marked L and LG, while the galvanometer is connected to the posts LG and G. The non-inductive resistance coil is connected from A to E, with usually a total of 10,000 ohms resistance.

A connection is tapped off at D such that the resistance from A to D is one-tenth of 10,000, that is, 1000 ohms. The tap at C is 100 ohms from A, and B is 10 ohms.

The term "shunt" is applied to that portion of the circuit which does *not* include the galvanometer, and is from A to the *slider*. The "galvanometer circuit" is that portion which contains the galvanometer, and on all settings except "*1*" will include part of the 10,000 ohm coil. The multiplying power of the shunt will be the ratio of the total current to that through the galvanometer alone. If Io = total current and Ig is the galvanometer current, then

$$\frac{Io}{Ig} = \frac{10{,}000+G}{s}$$ where G is the resistance of the galvanometer and s that of the shunt (from A to slider). It will be observed that the numerator is a constant for all settings on a given instrument. This is obtained by the arrangement of the slider. It makes the changes in the actual ratio inversely proportional to the resistance, s.

In making measurements of any kind it is necessary to know whether the resistance of the instrument will affect the result. To get the resistance of the galvanometer with shunt attached the following formula will hold:

$$Ro = \frac{s(10{,}000+G-s)}{10{,}000+G} = s - \frac{s^2}{10{,}000+G}$$

Charging Exchange Battery Over Long Line.

Please advise me how to charge battery at B without extra equipment. Sources of energy at A are a 42 volt generator, with positive terminal grounded, a 24 volt storage battery, and a 500 volt trolley. The loop resistance of the line from A to B is 60 ohms.

The 24-volt battery at A is out of the question, since its voltage is no higher than that of the battery to be charged. If you use the 42-volt generator two courses are open. You can charge metallic, or you can put the two wires of the pair in parallel, giving the equivalent of one wire of 30 ohms resistance. If metallic, you can count on about a quarter of an ampere. It is figured as follows: When fully charged, the battery at B will have a voltage of about 27.5 volts, and it is against this that we must figure on driving the current. 42—27.5=15.5, which is the net available voltage. The resistance is 60 ohms, which divided into 14.5, gives .242 ampere as the current. If a ground connection could be obtained which had no resistance, you could get .46 ampere by using the two wires in parallel, but the actual current would fall short of this, due to ground resistance.

Using the 500 volts direct to the pair metallic will give 7.87 amperes, but if the wires are used in parallel, with ground return, it figures out 15.8 amperes. There are two arguments against using the 500-volt trolley current. The current which will flow is larger than your battery needs, being a small branch board. Also the trolley will bring bad noises into your lines if connected this way. The 42-volt generator, metallic or grounded, is your choice. Look out for differences of ground potential, for which you might have to apply a correction, or discard the ground return scheme altogether.

Telephone News

New Taxation System Recommended in Wisconsin.

A. H. Dahl, state treasurer of Wisconsin, in his annual report to the governor, soon to be issued, urges the adoption of a new system of taxation for telephone companies of the state. Mr. Dahl says that under the present license fee system, the companies practically escape taxation.

The present law provides that on or before the 10th of February, each year, the company shall report to the state treasurer a true statement of the gross receipts from the operation of its business during the preceding year. Companies whose gross receipts are $100,000 or more, shall pay a license fee of 4 per cent; companies whose gross receipts are less than $100,000, shall pay a fee of 2½ per cent. In addition, all companies must pay 15 per cent of the gross receipts from exchange service to the state.

"I find that the majority of telephone companies do not incorporate under the state law," says Mr. Dahl, "and consequently no record of such new companies can be had, and many escape taxation entirely.

"I wish to call your attention to the seemingly absurd system of taxing telephone companies as regards the revenue received by the state from this source:

"Thirty-eight companies pay no taxes whatever to the state; one company pays two cents; two companies pay four cents; four companies pay five cents; three companies pay seven cents; fifty-four companies pay over seven cents and less than $1.00; one company reports 9,724 miles of wire in Wisconsin, 44 transmitters and 55 receivers and pays a tax of $25.72; one company owning 95 miles of wire, 150 instruments, pays a state tax of 13 cents; one company owning 82 miles of wire and 140 instruments pays 5 cents in state tax; one company having 50 miles of wire and 32 instruments pays 5 cents in state tax; one company having 52 miles of wire and 53 instruments pays no state tax.

"It seems that some other system of taxing telephone companies could be devised that would be more equitable, and by which the state would derive its share of taxes from this class of property."

New Deal in Indianapolis Telephone Affairs.

A new and advantageous deal in the Indianapolis telephone status is said to have been made, and, as there is no official denial, but many things indicating its existence, the statements are generally believed to be true. A well-authenticated report is to the effect that James S. Brailey, Jr., head of the Brailey syndicate, and president of both the Indianapolis Telephone Company, and the New Long Distance Telephone Company, has strengthened his hold on the situation in Indianapolis by buying up a controlling interest in the stock of the New Telephone Company, lessee of the Indianapolis Telephone Company, with the bonds of the New Long Distance Telephone Company. Mr. Brailey has, by this movement thoroughly intrenched himself and the interest he represents in getting control of the New Telephone Company, through ownership of a controlling amount of its stock, so that even should the court dissolve the lease now attacked by the state's attorney, assisted and abetted by the Central Union Telephone Company (which is not probable) Mr. Bailey would still be able to control the local plant and enter into the benefits of the new franchise now pending before the council.

As evidence that the deal has been consummated and that Mr. Bailey holds the whip hand over his opponents and persecutors it is admitted by the officials of the New Telephone Company that they have secured a voice in the management of both the New Long Distance Telephone Company and the acquired control of the New Telephone Company by a reorganization of the board of trustees; four of the Brailey syndicate men resigning and being succeeded by Wm. Fortune, George Hitt, H. B. Hiblen and L. B. Swift, officials of the New Telephone Company.

It is now generally believed that the suit to declare the lease of the New Telephone Company to the Indianapolis Telephone Company invalid will be dismissed, since the leasing company will be in possession of the lessee company and would continue to operate no matter whether the court upheld or rejected the validity of the case. The friends of the Independent telephone system in Indianapolis and throughout the state are greatly elated over the favorable turn in the condition of affairs in Indianapolis. The city council is due to act on the new or modified franchise and when this is done it is thought the opposition will be put to flight and defeat.

Good Condition of Ohio Companies.

Statements given out last week by the Cuyahoga and United States telephone companies, of Cleveland, show their solid condition. Not only did the Cuyahoga company have cash amounting to over $101,000, and the United States more than $62,000, but, according to a statement by President Brailey, the subsidiary companies of the United States company had on hand over $80,000 additional cash. The excess of quick assets over liabilities is more than $940,000.

Following are the statements:

THE CUYAHOGA TELEPHONE COMPANY.

Assets.

Treasury bonds	$492,000.00
Treasury stock	62,650.00
Cash in bank and on hand	101,378.56
Electric Realty Company stock	19,000.00
U. S. Telephone bonds (34)	27,802.86
Accounts receivable	145,000.00
Material and supplies, etc	52,000.00
Total	$889,831.42

Liabilities.

Bills payable	$219,400.00
Accounts payable	25,000.00
Accrued taxes	27,341.01
Accrued bond interest	45,033.34
Accrued rents and fees	1,050.00
Unclaimed wages and dividends	379.44
Surplus of quick assets over liabilities	581,627.63
Total	$899,831.42

THE UNITED STATES TELEPHONE COMPANY.

Assets.

Treasury bonds	$434,000.00
Treasury stock	30,000.00
Cash in bank and on hand	62,534.62
Accrued dividends from subsidiary companies	9,181.00
Accounts receivable	82,000.00
Bills receivable and interest	19,200.00
Material and supplies	36,000.00
Total	$672,915.62

Liabilities.

Bills payable	$222,750.00
Accounts payable	37,295.65
Accrued taxes	13,815.29
Accrued bond interest	35,933.33
Unclaimed wages	300.53
Surplus of quick assets over liabilities	362,820.82
Total	$672,915.62

Indiana Likely to Have a Public Utilities Law.

Owners of telephone companies, as well as gas, light, and water companies were invited to attend a meeting in Indianapolis, Dec. 9-10, for the purpose of discussing the question of State control of public utilities. A public utilities bill will be prepared and presented to the legislature

Great Northern Railway to Use Telephone Dispatching

The Great Northern Railway is now considering plans for the introduction of a telephone dispatching system over the greater part of its right of way, according to recent reports. Mr. L. W. Hill, president of the road, is quoted as saying that the matter has been carefully considered by the directors, and is likely to be the subject of favorable action at an early date. At the present time two eastern divisions of the Great Northern Railway are using the telephone dispatching system, and the installation of telephones is going on upon a third division. The success of the plan is reported from both divisions upon which it has been tried.

Missouri Telephone Convention, Jefferson City, May 19.

The dates set for the convention of the Missouri Independent Telephone Association are May 19 and 20, 1909. The meeting will be held at Jefferson City. This was determined a few days ago at the meeting of the Executive Committee, attended by the following members: M. L. Golladay, Holden; G. W. Schweer, Windsor; C. J. Meyers, Kansas City; W. H. Bassett, St. Louis, and W. R. Barkdull, Windsor.

Shade Trees Endangered by Conduit Construction.

Agitators for the protection of shade trees usually endeavor to influence telephone companies to put their wires underground, regardless of any economical considerations. At Kalamazoo, Mich., however, the residents of Portage street are up in arms over the prospect of damage to trees from the building of conduits. They say that, with the trenches dug close to the trees, there is danger of cutting off the main roots, and doing irreparable damage.

New Independent Toll Line in Michigan.

A new trunk line is being put up between Reed City and Saginaw, Michigan. The Citizens Telephone Company is putting in two new copper circuits from Reed City to Clare, and the Union company is extending the line from there on to Saginaw. The line will be in operation in about two weeks, and will be a very important addition to the long distance service in Michigan.

Telephone Patents

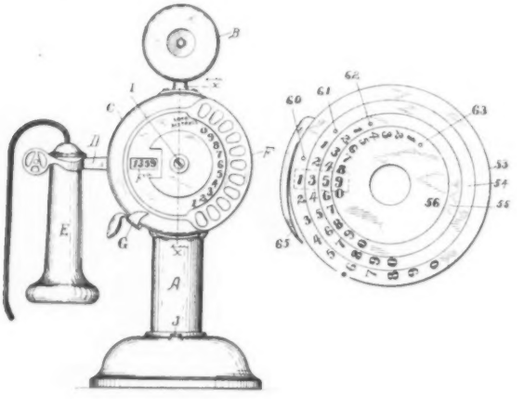
Conducted by Max W. Zabel

AUTOMATIC INDICATOR FOR TELEPHONES.

R. Sedgwick, Richmond, Ind., patent 903,898, Nov. 17, 1908.

Means for indicating to the subscriber of an automatic telephone whether he is properly calling the number he desires, is the object of this invention. More specifically it provides an automatic indicator for automatic telephones which will automatically bring into view of the user of the telephone the numerals indicative of the telephone he is attempting to call, bringing the figures into view progressively as they are indicated in the usual manner, whereby a mistake by the user may be detected by him before he rings the call, thus enabling him to correct his error without bother to the subscriber he has indicated by mistake, and also saving time.

The ordinary automatic dial *I* actuates a counting train, as indicated in the illustration. Each movement of the dial



moves one of the counting wheels, thus indicating the numerals which the hand-dial has stepped up in starting the call.

ELECTRICAL PROTECTIVE APPARATUS.

Frank B. Cook, Chicago, Ill., patent 903,812, Nov. 10, 1908.

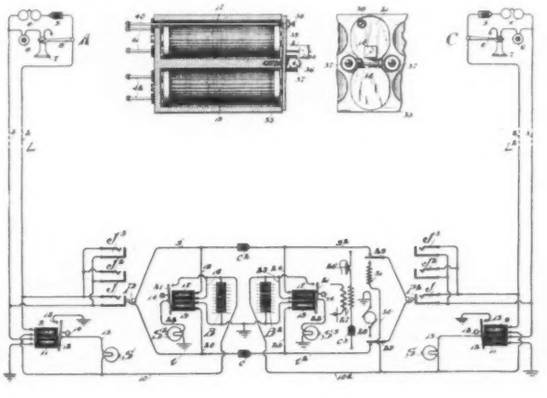
This patent is a divisional application of another patent, and covers special features of an electrical protective apparatus having means whereby the springs which are held together by the heat coil grounds the line circuit, in addition to opening it when the heat coil operates, this operation being performed by a suitable self-soldering heat coil.

TELEPHONE SYSTEM.

W. W. Dean, Chicago, Ill., patent 903,547, Nov. 10, 1908.

An electro-magnetic mechanism is used in the system described by this patent, and consists of two coils acting on a common armature. When one coil is thrown into the circuit, it attracts the armature to close the signaling circuit, and when the other coil is actuated, it draws the armature away and opens the circuit.

In the illustration, two relays are mounted in the same shell, having the relay coils 17 and 19 respectively, and acting on the common armature 21. The armature carries



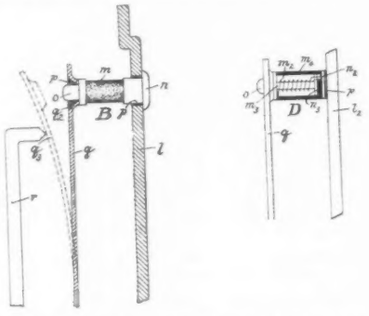
a weight 14, which serves to adjust its operative condition. The armature carries a contact 38, and when the magnet 17 attracts it, the contact is closed. When the coil 19 is energized, it overpowers the coil 17 and releases the contact.

It will be seen from the illustration that this relay can be used instead of the line relay and cut off relay.

CONTACTLESS THERMAL PROTECTOR.

Frank B. Cook, Chicago, Ill., patent 903,813, Nov. 10, 1908.

A contactless thermal protector is the subject matter of this patent, and consists of the plate *c*, to which is soldered



the heat coil *B*, which has the thermal element 10 secured in a metal piece *n*, which is soldered to the plate *l*, and the other extremity *o* is soldered to a spring *q*, which is grounded against a pin *r*, when the solder at *p* releases it.

ELECTROMAGNET.

B. W. Sweet, Cleveland, Ohio, patent 902,624, Nov. 3, 1908.

A new arrangement for electromagnets is shown in this patent, and consists in the provision of means for supporting the armature of the drop so that it can easily be removed, and the coil taken out of the drop shell. The drop shell is securely fastened to a front strip. The drop coil has the projecting contact springs which connect with the jack, and which project through holes in the drop shell. The coil is easily withdrawn when the armature is removed from the drop shell. The means for readily releasing the armature comprise a fork-bar into which the armature shaft projects, and where it is held in place when the armature is mounted by pivotal hooks. Releasing the hooks permits the armature to be removed and the drop coil to be withdrawn. from its shell.

TELEPHONE EXCHANGE SYSTEM AND APPARATUS.

D. B. Wick, Jr., Cleveland, Ohio, patent 904,105, Nov. 17, 1908.

A telephone exchange system is covered by this invention. Compound wound cut-off relays, adapted under predetermined conditions to close and open the circuit of the line signal lamp, and to introduce impedance into the circuit are used. In the cord circuit are provided three separate relays, two of which serve the well known function of supervisory relay, while the third or controller relay is provided with compound windings, designed to co-operate with the supervisory relays, and with the associated line relays to operate the lamps.

WIRE REEL.

F. L. Johnson, Hereford, Tex., patent 904,131, Nov. 17, 1908.

The wire reel described in this patent consists of a frame, which is pivoted on a base and formed with flat radial arms twisted to provide flat end portions. Yokes are slidably mounted on the end portions, and have coil retaining arms with lateral projections hinged thereto.

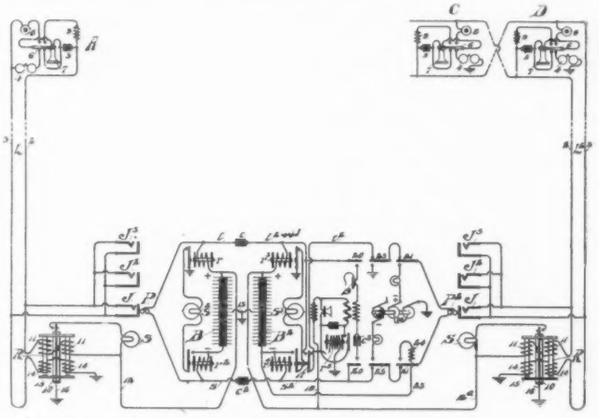
Bars are provided which connect the pairs of the coil retaining arms, consisting of pairs of arms hinged at their outer ends to the coil retaining arms and having overlapping inner end portions with hooked ends engaging each other.

The idea is that the four coil retaining hooks can be bent inwardly to release the wire by releasing the jointed arms. When the wire is in place, the jointed arms are lowered and the hook-retaining members are pushed into place to hold the wire.

TELEPHONE SYSTEM.

F. W. Dunbar, Chicago, Ill., patent 904,850, Nov. 24, 1908.

This patent contemplates providing each telephone line with a polarized signal relay when the subscriber is calling the cen-



tral office, and is rendered inoperative when the connection is established with the line.

The system includes two central station batteries which are necessary for its operation. Details of the operation will be apparent from the illustration.

AUTOMATIC FIRE-ALARM, BURGLAR-ALARM, AND TELEPHONE SYSTEM.

Geo. F. Milliken, Boston, and F. W. Cole, Newton, Mass., patent 904,550, Nov. 24, 1908.

An automatic fire alarm, burglar alarm and telephone system is covered by this patent. The central station is provided with a signal receiving apparatus, connected with the telephone circuit which is adapted to receive the automatic fire alarm and burglar alarm calls, either or both, in a manner easily distinguishable from each other. The automatic fire alarm or burglar alarm equipment at the subscriber's station, and the signal receiving apparatus at the central station are all arranged and connected with the telephone line so that the use of the telephone is permitted at all times without interference.

SIGNALING SYSTEM.

G. Babcock, Rochester, N. Y., patent 904,918, Nov. 24, 1908.

This patent relates to combined fire alarm, police signal and telephone systems, in which it is desired to make the operation of the various different parts as automatic as possible. In general the system is intended to cover a construction whereby the fire alarm boxes and police signal boxes are locked in a single circuit, and the policeman's number and the number of substation may be automatically telegraphed to the central station when the policeman or watchman opens the box to use the telephone apparatus in order to communicate with the central station. This is accomplished by means of different keys used in opening the box, each key operating the proper mechanism for recording the policeman's number.

TELEPHONE BRACKET.

B. M. Lampert, Cedar Bluffs, Neb., patent 903,733, Nov. 10, 1908.

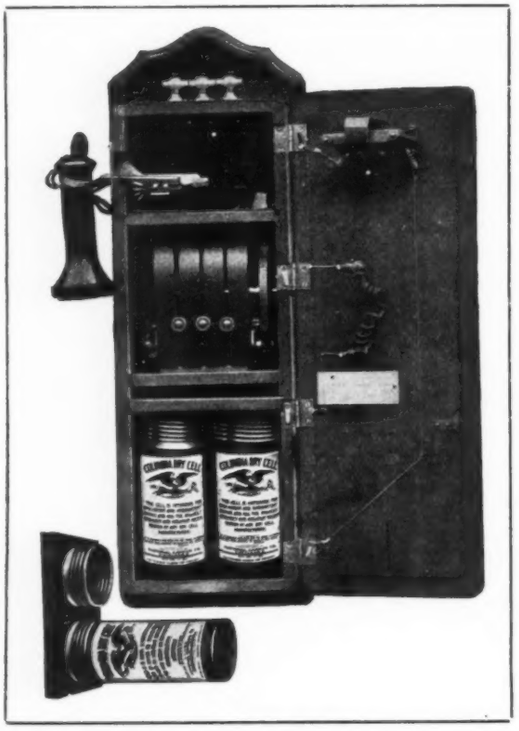
A telephone supporting bracket is covered by this patent. It consists of the ordinary lazy-tongs, which are mounted on a vertical rod, provided with a suitable sleeve, which is operated by a foot lever, so that when the foot-lever is actuated, the lazy tongs move outwardly and projects the telephone toward the user. When the user releases the telephone, the spring means which are also included, serve to retract the telephone to its initial position.

In the Manufacturing Field

The Patterson Wireless Dry Battery Holder.

An invention of high intrinsic merit is being marketed in the form of the "Patterson Wireless Dry Battery Holder." Essentially the idea consists of providing, for dry batteries, a screw socket much like that used for holding the Edison base incandescent lamp, and making the battery terminals in suitable form for attachment to this socket. The whole idea, including the application to a wall telephone by means of a removable shelf, one of its many special uses, is clearly shown in the accompanying illustration.

Telephone men have, for as long a time as they can remember, thought it necessary to connect dry batteries by wires. A moment's consideration will show that wire connections present certain disadvantages, such as loss of time in preparing the wires and attaching them; liability to loose connections through careless tightening of screws; and lack of neatness in appearance. Further than this,



Wall Set Showing the Wireless Dry Battery Holder in Use.

when batteries are stood on end upon a wooden shelf, exposed to moisture, partial short circuiting of the cells, and grounding of the battery, are possibilities which cannot be overlooked.

Every telephone man, in setting up a heavy battery of dry cells in the old fashioned way, has been annoyed by making wrong connections, destroying the usefulness of certain cells, and other difficulties. With the "Wireless" battery connectors once properly located and connected, a boy may renew the batteries without possibility of error.

Battery trouble at subscribers' stations causes a heavy maintenance expense on rural lines. Part of this trouble is in the cell itself, and part in the connectors. The wireless battery connector eliminates danger of poor connection, as any defect can be remedied by a subscriber. Spare cells can be left on the subscriber's premises for insertion in the telephone if the old ones become too weak for use between the regular visits of the repair man, or one cell can be removed, and the circuit, automatically closed through the empty connector, will still supply current at the full output of the remaining cell.

In exchanges, the Wireless Dry Battery Holder shows very interesting possibilities as a space saver and an aid to obtaining that neatness of appearance which is such a characteristic feature of the smooth-running central office. In connection with desk stands at subscribers' stations, too, its utility is apparent, as it may be simply attached to a desk, in a convenient location, with no risk that someone will kick over the cells, or pull the wire loose and then complain that the instrument does not work.

Stanley & Patterson, 23 Murray Street, New York, the manufacturers of the "Patterson Wireless Dry Battery Holder," have devoted careful attention to adapting this equipment to all classes of uses in telephone exchanges. They have prepared interesting literature, and state that they are able to show to telephone exchange managers that this equipment is not only a convenience, but is an absolute money saver. A new bulletin goes into general descriptions of the holder and its uses for particular purposes, and shows more in detail than the above article how it is fitted to overcome the difficulties experienced in the use of dry batteries according to present practice.

San Francisco Protective Apparatus Ordered.

Frank B. Cook, 242 W. Lake street, Chicago, states that he has received the order for the protectors and frames for the new San Francisco exchange.

The order carries both main and intermediate frames of the Cook type, and his No. 10 type of protector, which type was first installed in St. Louis, Mo., in 1906, the installation being 16,000 pairs. Since the first installation, the No. 10 protector has rapidly gained favor, until at the present time he has sold over 200,000, not including this big order for San Francisco.

The order is as follows:

Main Office.—9,250 pair main frame with protectors; 1,680 pair intermediate frame.

South Office.—5,000 pair main frame with protectors; 1,200 pair intermediate frame.

West Office.—5,400 pair main frame with protectors; 1,400 pair intermediate frame.

Howard Street Office.—5,600 pair main frame with protectors; 1,400 pair intermediate frame.

Points of interest relating to the No. 10 protector are stated by Mr. Cook as follows:

1. It is a resoldering protector.
2. Has only one contact in the circuit.
3. Resoldering a coil tests it automatically.
4. The heat coil is of the composition type, which never burns out or short circuits.
5. The springs of each pair are separated and insulated from all adjacent springs.
6. No bolt connections are used to transpose the line and the switchboard terminals.
7. There are no loose contacts in the circuit.
8. There cannot be a defective coil in the circuit.

The Standard Underground Cable Company, Pittsburg, Pa., was represented at the International Independent Telephone convention by J. R. Wiley, J. E. O'Neill, and W. M. Rogers, of Chicago; A. A. Anderson, of Pittsburg, and E. J. Pietzcker, of St. Louis.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

NEW COMPANIES.

FOLEY, ALA.—A telephone company is being organized in Baldwin county with $2,500 capital stock. J. C. Stapleton, of Belforest, is president, and Arthur Cheney, of Loxley, is secretary. It is proposed to construct telephone lines to Bay Minette and Daphne, Loxley, Ala., being the central station.

BOISE, IDAHO.—The Settlers' Mutual Telephone Company of Rupert, has been incorporated with a capital stock of $48,000. The incorporators are: L. R. Adams, Roy W. Adams and Charles C. Nelson.

BURR OAK, MICH.—The Burr Oak Mutual Telephone Company has been organized with $10,000 capital to build and equip telephone lines into Burr Oak. The Burr Oak exchange will have connection with the Bronson exchange of the Bronson Mutual Telephone Company.

PLEASANTON, MICH.—The Southeast Pleasanton Telephone Company has been organized with the following officers: President, Jas. M. Allen; vice-president and secretary, Jones Babcock; treasurer, O. Kirstead.

ST. CLAIR, MICH.—The farmers living along the Lindsey road recently organized a telephone company, for the purpose of building lines to connect with the St. Clair exchange. This company is to be known as the Lindsey Road Telephone Company. The officers and trustees are: President, Julius Beyer; vice-president, Otto Bandlow; secretary, Albert Beyer; treasurer, August Guildenstein; trustees, Wm. Beyer, Fred Douglass, Geo. Emig, August Staebler, Wm. Lindow, Christian Guildenstein, Chas. Krantz.

ADVANCE, MO.—The Advance Telephone Company has been organized at this place. The officers are: President, J. H. Schonhoff; secretary-auditor, W. E. Finney. The new company has taken over the property of the Puxico Central Telephone Company, which operated exchanges at Advance and Puxico, connecting with the exchange of the Southeast Missouri Telephone Company at Bloomfield, Mo. The capital stock of the company is $12,000. A metallic toll line from Puxico to Poplar Bluff connecting with the lines of the Poplar Bluff Telephone Company, has just been completed.

ALBANY, N. Y.—The Phelps Home Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are C. M. Clark and H. F. Flint, Clifton Springs, and W. A. Hawe, Phelps.

CARNEGIE, OKLA.—The merchants of this city have organized an Independent telephone company to be known as the Carnegie Telephone Exchange. Articles of incorporation have been taken out with a capital stock of $10,000. The directors are: G. O. Hall, W. P. Pevy, and Mrs. May Hall, all of Carnegie.

SOUTH SHORE, S. D.—Wm. Boice, F. A. Zirble, and J. J. Fry are the incorporators of an Independent telephone company that will run up the Antelope Valley, connecting with the local exchange. Material for the new line is arriving and active construction work will be commenced soon under the supervision of David R. Burt. The new company will be known as the Antelope Valley Telephone Company.

NORTH YAKIMA, WASH.—The Lower Naches Telephone Company of North Yakima has filed articles of incorporation. The capital stock is placed at $3,500 and the incorporators are: John Doble, W. T. White, A. H. Blair, Lawrence Jacobson and C. W. McCormick.

BRANDON, WIS.—The Brandon Telephone Company of Brandon has been incorporated with a capital stock of $4,000. The incorporators are H. L. Brown, G. E. Dickinson, F. G. Henske, E. H. Sherwin and F. R. Schwandt.

HARTFORD, WIS.—The Hartford Rural Telephone Company has been organized with a capitalization of $1,500. The officers are: President, E. M. Anderson; vice-president, Daniel Schultz; secretary, A. W. Brown; treasurer, Michael Reik.

CORNWALL, ONT., CAN.—The Stormont Telephone Company, with headquarters at Gallingertown, has been organized with the following officers: President, Dr. E. Brown, Aultsville; vice-president, W. A. Edwards, Gallingertown; secretary-treasurer, W. H. Alexander, Pleasant Valley; directors, O. M. Rombough, Pleasant Valley; Wm. Scott, Pleasant Valley.

FINANCIAL.

TROWBRIDGE, ILL.—The Trowbridge Mutual Telephone Company has increased its capital stock from $1,500 to $3,000.

MINNEAPOLIS, MINN.—The Tri-State Telephone Company has declared a quarterly dividend of 1½ per cent, payable December 1.

CUMBERLAND, WIS.—The McKinley Telephone Company has increased its capital stock from $1,500 to $3,000.

FRANCHISES.

HICKMAN, KY.—A twenty-year franchise has been granted by the city of Hickman to the Hickman Independent Home Telephone Company. This takes all the legal obstructions out of the path of the Home company's progress, and construction work will be rapidly pushed.

OAKLAND, NEB.—The New State Telephone Company has applied for a franchise to install a toll station and exchange in this place.

PHELPS, N. Y.—A new franchise has been granted the Phelps Home Telephone Company by the board of village trustees. Representatives of the company state that the telephone system here will be rebuilt and enlarged.

JAMESTOWN, N. D.—The board of county commissioners has granted a franchise to Lewis C. Lane to construct and maintain a telephone line along the highways of Stutsman County.

FREDORIA, OHIO.—A franchise has been granted the Berringer Telephone Company by the city council.

GOLDENDALE, WASH.—The Council of Goldendale has granted a franchise to the Union Telephone & Telegraph Company to erect poles and have the right-of-way through the city for a telephone system. This is a company composed mainly of farmers of Klickitat County, the main stockholder being Charles F. Keyser.

CONSTRUCTION.

MARION, ALA.—Telephone service is to be extended through this county. G. F. Walters, of Marion, and Lee Dobbins, of Scott, Ala., are among those interested.

FORT SMITH, ARK.—The Independent Telephone Lines Association plans the construction of a long distance line to Little Rock.

MODESTA, CAL.—An extension of the Paradise rural telephone line has just been completed and placed in service.

WEST RIVERSIDE, CAL.—The Home Telephone Company has placed extensions on some of its poles, permitting the lines to clear the trees, thus doing away with tree trimming.

CEDAR KEYS, FLA.—The East Florida Telephone Company is stringing wire from Ellzey into this place. This will give Cedar Keys telephone communication with a large number of towns, and will be of special use to the fishermen who do an extensive shipping business.

VIDALIA, GA.—The Vidalia Telephone Company is making extensive improvements to its system in this city. The Longpond line has been completed and a line to Cedar Crossing is contemplated.

GALVA, ILL.—The Independent Telephone Company has just finished putting up a new copper wire from this city to Galesburg, replacing the old iron wire. This completes a copper circuit all the way to Burlington, while the work of extending the same character of service from Galesburg to Peoria and from Galva to Kewanee is progressing rapidly.

MONMOUTH, ILL.—The Monmouth Telephone Company has begun construction on a new line to Aledo, where connection will be had with the exchange of the People's Telephone Company.

SHABBONA, ILL.—The De Kalb County Telephone Company has made many improvements in its system in this place.

ELKHART, IND.—The Home Telephone Company is stringing a new 150-pair cable to Allendale and the Sterling-Hudson addition.

HARLAND, IA.—The Harlan and Avoca Telephone Company is installing a new switchboard in the local exchange.

KINGSLEY, IA.—The Kingsley Telephone Company has decided to install a new switchboard in the local exchange.

LE MARS, IA.—The Plymouth Company is building new lines in Marion township and extending lines to Grant and Washington townships.

SHENANDOAH, IA.—Many improvements are being made by the Mutual Telephone Company to its country lines.

WAUKON, IA.—The system of the Standard Telephone Company in this place, is to be thoroughly overhauled and put in first-class condition.

ABILENE, KAN.—The Brown Telephone Company is building a new line from Abilene to Solomon.

EL DORADO, KAN.—The Butler County Telephone Company is installing a new switchboard in its exchange in this place.

LIBERAL, KAN.—The Liberal Mutual Telephone Company is building a new office in this place.

LYONS, KAN.—The Lyons Telephone Company is preparing to extend its cable line to the east, past the Park school house.

SANDS CITY, KAN.—The Beaver and Cimarron Valley Telephone Company has placed an order for a new switchboard to accommodate its increasing business.

ALPENA, MICH.—The Alpena Mutual Benefit Telephone Company is rebuilding the Hilman telephone line.

CHARLESTON, MO.—The Southeast Missouri Telephone Company has recently purchased new and larger switchboards for its exchanges at Dexter and Caruthersville, Mo. It is now rebuilding the latter exchange and intends, as soon as this work is completed, to re-build the exchange at Kennett, Mo. The completion of this work will make all of the nineteen exchanges of the company thoroughly up-to-date, both in construction and equipment.

COLUMBIA, MO.—Plans have been completed and work will soon begin on the new Independent telephone plant, which will include everything that is new and up to date. An underground cable system will be placed in the business district. The improvements will cost over $50,000. Col. J. A. Hudson is the owner of the system.

MEMPHIS, MO.—The Downing Telephone Company is rebuilding its entire exchange. It has installed a new switchboard and will add about 2,000 ft. of cable to the outside plant.

MORA, MO.—A new telephone line is soon to be erected east of here.

MOREHOUSE, MO.—The exchange of the Southeast Missouri Telephone Company was destroyed by a recent fire. Service was resumed within a few days by the use of an old switchboard which will be used temporarily.

DODSON, MONT.—Robert Moore proposes to construct a telephone line to Harlem in the spring.

ALBERQUERQUE, N. M.—Work is now progressing on the telephone line which will give connection between Silver City and the Mogollon and adjoining mining districts, nearly a hundred miles distant.

CHATHAM, N. Y.—The Chatham Co-operative Telephone Company has recently built a line through to Harlemville, which has added fifty new subscribers to its list.

MARS HILL, N. C.—The North Buncombe Telephone Company has decided to install a modern telephone exchange in this place.

BEACH, N. D.—Work on the construction of a telephone system will soon be commenced by the Golden Valley Telephone Company.

ASHLAND, PA.—The American Union Telephone Company has just completed the trunk lines between Pottsville and Tremont. The two lines between Pottsville and Schuylkill Haven and Pottsville and Orwigsburg were also recently completed The company now has 939 telephones connected with its Pottsville exchange.

FAYETTEVILLE, PA.—The American Union Telephone Company is rebuilding its line between this place and Waynesboro.

WAYNESBORO, PA.—Work has been commenced upon a telephone system for the C., G. & W. St. Ry. Co., from Marion to Chambersburg. This will enable the officers in this place to communicate quickly with all parts of the system.

BELLE FOURCHE, S. D.—The Northwestern Land Company has drawn plans for the construction of about 75 miles of Independent telephone lines in Butte County.

BIG STONE, S. D.—The Grant County Telephone Company is extending its lines into Roberts County.

ROCKHAM, S. D.—The Rockham Telephone Exchange is extending its lines in the vicinity of Howell.

LAREDO, TEX.—A telephone line is being constructed to connect Rio Grande City with Laredo, following the movement on foot to build a Rio Grande railroad.

WHITE BLUFFS, WASH.—A company has been organized which will construct a line to Kennewick. The line will be about 50 miles in length.

DAVIS, W. VA.—The Consolidated Telephone Company is installing a switchboard at this place.

SUPERIOR, WIS.—The Douglas County Telephone Company is extending its lines at an expense of about $15,000.

WASHBURN, WIS.—A new telephone line connecting this city with the village of Cornucopia and the north shore is the latest line contemplated. H. Marion Juel, chairman of the town of Bell who is the leading figure in the new enterprise, says that the line will be built in the spring just as soon as the snow leaves the ground.

REGINA, SASK., CAN.—Good progress is being made on the various telephone systems, now in course of construction in the province. The line between Saskatoon and the capital, 200 miles, has advanced as far as Findlater, and the linemen on the Regina-Antler system are expected to be in Arcola shortly. Two rural companies are constructing telephone systems, tapping the country contiguous to the town of Drinkwater. At Creelman a company has begun operations looking to the installation of a telephone system. Another company has started telephone construction out of Lumsden.

WINNIPEG, MAN., CAN.—The city council has decided to at once construct the proposed telephone line in connection with the civic power plant at Lac du Bois, at an estimated cost of $6,500. F. E. Cambridge is city electrician.

ELECTIONS.

ATLANTIC, IA.—At the annual meeting of the stockholders of the Massena Independent Telephone Company the following directors were elected: J. P. Waters, J. R. Eblen, Ernest Maas, E. W. Willoughby, George Bernhardt, M. J. Sullivan, H. F. McKee, F. D. Kirkman, John C. Casey, J. E. Froman and F. M. McDermaid.

IOWA CITY, IA.—The following officers have been elected by the Johnson County Telephone Company: President, A. T. Averill, Cedar Rapids; vice-president, S. W. Mercer; secretary and treasurer, Jay Chatham; manager, Roy Wertz. Directors, A. T. Averill, G. M. Averill, H. N. McDonald, Jay Chatham and S. W. Mercer.

ADRIAN, MICH.—The stockholders of the Farmers' Telephone Company have elected the following officers for the ensuing year: President, Edwin Newell; vice-president, Mr. Elder, of Petersburg; secretary, G. E. Rusling; treasurer, R. A. Baker. C. S. Balsly, J. W. Conner, E. I. Glacken, M J. Crouch, C. C. Sleet. W. T. Black, general manager and superintendent with full charge and control of all three exchanges of the company.

RICHMOND, MO.—The stockholders of the Blue Ribbon Telephone Company have elected the following officers: John D. White, president; G. M. Schooley, secretary; R. A. Ottman, treasurer.

CHATHAM, N. Y.—At a recent meeting of the Chatham Co-operative Telephone Company the following officers were elected: President, Dr. W. R. Starks; vice-president, P. G. Babcock; secretary, F. B. Pratt; financial secretary, E. B. Gifford; treasurer, R. W. Seymour.

HICKORY, PA.—At the annual meeting of the Hickory Telephone Company the following officers were elected: W. E. Rankin, president; C. C. Coates, vice-president; H. S. Buchanan, secretary; R. L. Hays, treasurer; L. Smith and Robert Jeffrey, managers.

CUMBERLAND, WIS.—The following officers have been elected by the McKinley Telephone Company: President, E. J. Pfluger; vice-president, Carl Hanson; secretary, C. J. Poneter; treasurer, Oscar Risberg; directors, John Lejeune, Anton Landmark, C. J. Poulter, John Petersen and D. C. Keeler.

MISCELLANEOUS.

UNIONTOWN, ARK.—The telephone exchange of which L. A. Wood is proprietor was destroyed by a recent fire. The switchboard was saved.

WARREN, ARK.—J. C. Savage, of the Valley Telephone Company, is interested in the organization of the County Telephone Exchange.

WASHINGTON, D. C.—The Brazilian Diario Official of September 26 publishes a decree authorizing the transfer to Messrs. Guinle & Co., a concession granted to Eduardo Pellew Wilson for the installation and working of telephone lines and apparatus in the town of Bahia, Brazil.

ORLANDO, FLA.—The Orlando and Oviedo telephone line has been purchased by W. J. Davids, of Fort Ogden, Fla.

INDIANAPOLIS, IND.—Mr. Ira T. Swartz, 201 New Odd Fellow building, this city, is a man who has in the past few months sold a good many thousand dollars worth of high-grade Independent telephone securities. One of the methods he is using to get in touch with people and keep them interested is the issuing of a paper known as "Swartz' Telephone Siftings." The first number, which recently came out, contained much interesting matter. We understand that the paper is distributed free of charge to people who are likely to become interested in the telephone business.

ELDORADO, KAN.—The Butler County Telephone Company has purchased the Beaumont Telephone Exchange and the connection of the Andover Mutual

ADRIAN, MICH.—The Adrian Telephone Company has purchased the State Line Telephone Company formerly owned by E. B. Lee, of Weston. This company comprises the exchanges at Weston, Metamora and Lyons, also toll lines in that vicinity.

HOPKINS, MO.—J. W. Wells is president and Oscar Nelson is secretary of the Maple Leaf Telephone Company, which is making an effort to establish a farmers mutual telephone switchboard exchange in Hopkins.

DALLAS, TEX.—J. C. Casler, on the part of the Independent telephone company, has filed a written acceptance of the ordinance granting A. J. Brown and associates an extension of time within which to begin actual work on the construction of the 10,000-line Independent system for Dallas.

CRANBROOK, B. C., CAN.—The capitalists interested in the new telephone company recently organized under the name of Kootenay Telephones, Ltd., are: Dr. J. H. King, W. F. Gurd, James Ryan, V. Hyde Baker, A. Leitch and R. E. Beattie.

UNDERGROUND.

SANFORD, FLA.—The petition of G. H. Fernald, of the Sanford Telephone Company, to the Sanford council for permission to place certain of the telephone wires within the city limits, underground, has been granted.

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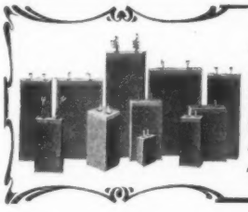

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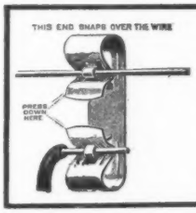

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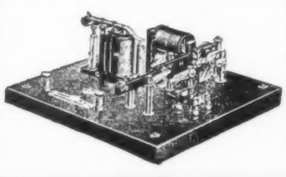

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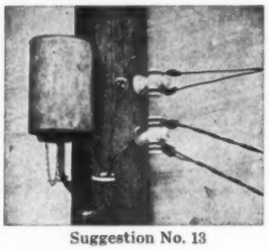

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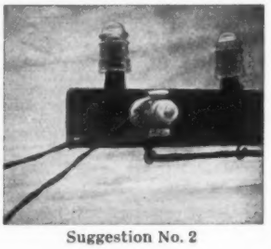

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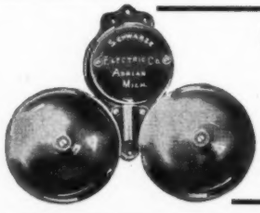

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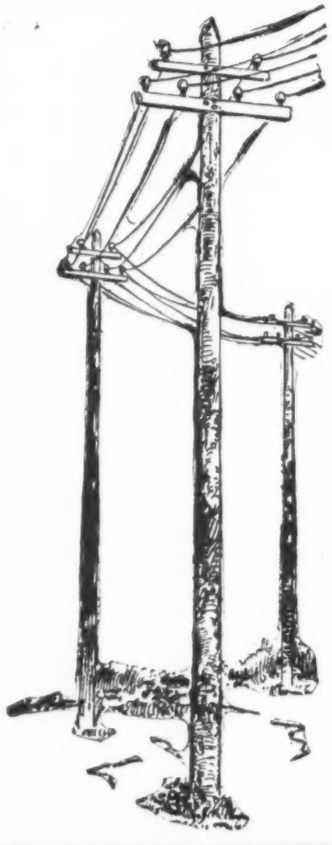

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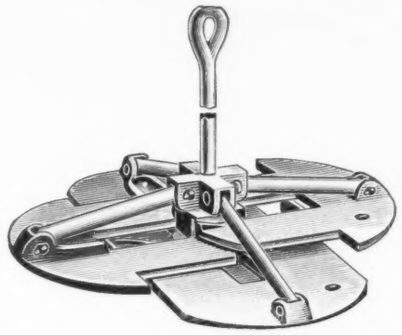

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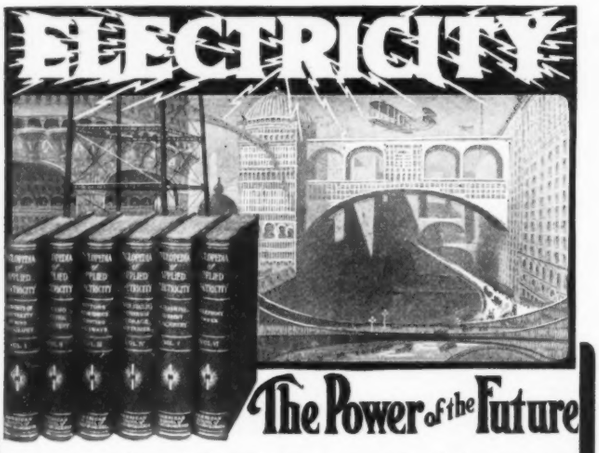

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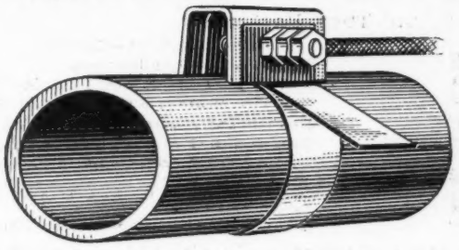

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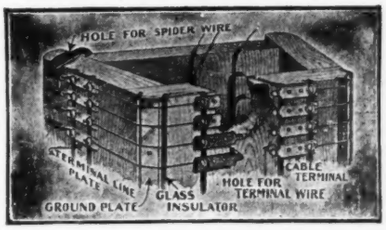

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